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GENERAL PRACTICE SERIES

THE DIAGNOSIS AND TREATMENT OF DEPRESSIVE STATES

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It has been estimated by numerous workers that 10-20% of the patients seen by the general practitioner are psychiatric problems, the majority being depressive states. The importance of the early recognition and expert handling of the depressive state with ominous attributes is emphasized by four significant sets of facts.

1. Of all psychiatric cases, the depressive states respond best to psychiatric treatment. The prognosis is excellent in 90% of cases.

2. Parnell and Skottowe[6] point out that more people commit sucide than are killed on the roads. In 1954, 5,043 suicides occurred in England and Wales, representing an average of 14 suicides a day—an increase of nearly 50% in the suicide rate in the past 10 years.

3. Investigation has revealed that the majority of suicides occurred when the individual was in a state of mild or chronic depression, many of the victims not having been under any medical care. That this condition is becoming increasingly prevalent is borne out by recent reports on the increasing number of suicides that occur in elderly persons and the fact that this group includes many examples of unrecognized involutional depression.

4. It is appreciated that the greatest care will never save the occasional patient who commits suicide without warning, for example during an explosive psychopathic reaction, hysterical condition or state of drunkenness. But the unexpected suicide which comes as a surprise to the family doctor, relatives and friends unfortunately occurs only too frequently in the most valuable members of our society, people with high principles, good personality, warm, friendly unassuming and conscientious individuals, hard-working and reliable and holding responsible positions. The symptoms of these patients have not been those of classical depression and embarrassed by symptoms which they tended to minimize, they have been diagnosed as an anxiety state or anxiety neurosis, and one or other of the tranquillizing drugs has been prescribed as a placebo with unfortunate consequences.

The public have to be frequently reminded that a state of depression of persistent type, or a vague illness with no physical cause that comes on either insidiously or out of the blue, is a cause for serious concern. This is especially so if the danger signals of minor signs of depression are present; these are insomnia, loss of appetite and libido, abnormal tiredness, and a slumping of interest and loss of normal pleasure in living. A greater awareness is necessary amongst practitioners and the public of what can be done with psychotherapy and the judicious use of electro-cerebral therapy, which has undoubtedly proved its worth in the past 15 years.

The treatment of depressive states depends on the practitioner's ability: (i) to recognize that the depressive state is the predominant condition and to classify it as typical or atypical; (ii) to assess its mildness or severity and to decide whether the case is of ominous type, i.e. whether there is any suicidal risk; (iii) to decide how far the depressive state is dependent on physical disease: (iv) to determine the constitutional loading and temperamental predisposition and what external influences have helped to precipitate the illness and their relative importance in each individual case.

THE RECOGNITION OF THE DEPRESSIVE STATE AND ITS DANGER SIGNALS

According to A. G. Lewis,[4] the most important single diagnostic feature is the persistent unpleasant change in mood, and the following definition of a morbid depression is worth remembering:

'Any person who is unhappy and ill with his unhappiness may be properly said to be suffering from a depressive illness.' This can be elicited by:

(*a*) Asking the patient how he feels, to discover what his mood is;

(*b*) Observing the patient's expression. Often an individual does not complain of depression or even denies that he is depressed and emphasizes physical symptoms such as

headache, dyspepsia, fatigue, etc. Their expressionless facial appearance, lack of emotional response and animation, manner of speech indicative of slowness or difficulty in thinking, absence of sense of humour, and mirthless smile, allows these people to be recognized as being depressed.

(*c*) Observing the behaviour. The patient's inability to suppress signs of restlessness and agitation or overcome slowness and heaviness of movement.

In the typical classical depressive illness, whether acute or chronic, mild or severe, the main symptoms are (1) depression, (2) difficulty in thinking, (3) psycho-motor retardation. Other symptoms may be superadded, and any one may predominate. Retardation may be only subjective and it may be appreciated by the patient alone as difficulty in thinking, inability to concentrate and to carry out his usual occupation or even to drive a car, due to the slowing up of thought processes. Everything seems a tremendous effort. The incapacity is greater in the patients' report than is apparent in their behaviour.

THE ACUTE, SEVERE DEPRESSIVE STATE

The acute case of recent onset who is completely incapacitated by depression presents an obvious appearance of sadness, dejection and misery. The slowness of movement, lack of spontaneity, attitude of hopelessness, the complaints of feeling depressed, afraid and finding life not worth living, is diagnostic; the suicidal risk is great, and urgent psychiatric treatment is imperative. Owing to the patient's inability to look after himself, admission to a nursing home or mental hospital is rarely resisted by the patient or relatives. In the same way, the patient with acute or chronic agitated depression, sometimes seen in the manic-depressive disorders but more usually in the involutional depressions, presents no difficulty in diagnosis; it is usually the first attack of severe depression, and the picture of severe aimless restlessness. Pacing the floor and wringing the hands (the outward motor expressions of extreme mental anguish and mental unrest) repetitive talking about various troubles which, according to the relatives, are grossly exaggerated, self-reproach in the absence of adequate cause for guilt, and hypochondriacal ideas and preoccupation with bodily sensations and symptoms which are often delusional, are typical findings of the classical deep serious depressive illness, involutional or endogenous. These often occur without adequate external psychogenic cause; and, as Watts[8] points out, it is only 1 in every 6 that presents with the obvious classical deep depressive state described above; the other 5 are milder atypical types and more difficult to diagnose.

THE ATYPICAL TYPES OF DEPRESSION OF ENDOGENOUS TYPE—NON-OMINOUS AND OMINOUS

These cases appear as anything but depressive states and may deny emphatically that they feel depressed. These are the disguised endogenous depressive equivalents that are mistakenly diagnosed as anxiety states or anxiety neuroses—with occassional tragic sequelae. They fall broadly into 2 groups:

1. The tense, shy, anxious fearful individual who complains of a state of apprehension and anxiety which is not usually recognized as the predominantly presenting symptom of an ominous depressive state.

2. The people who complain of such symptoms as persistent and ill-defined headache, loss of appetite, impaired indigestion, a bad taste in the mouth, constipation, palpitations, blurring of vision, backache, irritability, lassitude and undue fatigue. They are often convinced that they are suffering from a genuine physical complaint, or rationalize their condition and attribute it to some external cause (not known to the doctor to be unimportant if he does not question the patient's relatives and friends). These are the missed cases of endogenous depression. They are referred to specialist physicians and investigated for tuberculosis, gastro-intestinal diseases, etc. after careful clinical examination by the practitioner, and referred back to him by the physician as cases of functional disorder or hysteria with no organic disease found. Tranquillisers of numerous types are prescribed, the practitioner loses interest, the patient insidiously becomes more depressed and, losing touch with the doctor, he feels increasingly bewildered, desperate and hopeless; in an access of melancholia he may end his life. The milder unprogressive cases make a spontaneous recovery after 3 to 18 months of semi-invalidism. Those who are diagnosed correctly by the family doctor are the cases with whom he spends that extra half hour, and then sees twice weekly and is able to elicit positive findings. He finds out that there is no adequate psychological cause or precipitating factor that can account for the patient's condition; on questioning, the patient will invariably admit to a persistent altered mood of inexplicable gloom. Loss of appetite and loss of weight continue, and also disorder of sleep rhythm. Early morning wakening and resistance to hypnotics is a common finding, usually associated with a feeling of tension, apprehension and anxiety which occurs in varying degrees of severity, at times amounting to actual fear and terror at the prospect of being left alone. It is not generally appreciated that fear or morbid anxiety is an intimate and integral part of the depressive state. This symptom is invariably found, on investigation, to have no logical basis.

Other helpful diagnostic pointers are a history of previous attacks of depression or mood-swings, i.e. periods of mild depression alternating with periods of over-activity and infectious gaiety sometimes amounting to elation, and the absence of an adequate precipitating cause, the condition having developed either insidiously or suddenly. Oliven[5] stresses that concomitant symptoms of loss of libido, intractable insomnia, continued loss of appetite and abnormal fatigability should be taken as danger signals. Other warning indications are the confession of a suicidal urge, the presence of agitation, or the patient's admission that he has thoughts of suicide.

The family doctor should not be afraid to ask the patient whether he finds life worth living or whether he has had thoughts of suicide as a way out. Once he has the confidence of the patient, he should ask in detail regarding thoughts of suicide and should try to estimate the depth of the patient's despair and the strength of his impulses. He should discuss the matter fully and frankly and reassure the depressed patient that they are symptoms of depression which will disappear at the end of the depressive state which, itself, can be treated extremely successfully, safely, painlessly and rapidly by an experienced psychiatrist. An admission by a patient of suicidal thinking is an indication for immediate hospitalization and reference for psychiatric treatment.

If there is a history of attempted suicide in the past, or

in cases where there is a family history of suicide or still more of a family mode of suicide, the outlook should be considered ominous. Any mild uncomplicated case of depression that shows no sign of improvement after being seen regularly, twice weekly, for over 1 month, or any depressed individual who has been ill for over 3 months, should be referred to a psychiatrist. It should not be considered less ominous because it is an understandable reaction to circumstances. The so-called reactive depression is one which is predominantly psychological in its causation and is precipitated by environmental stress such as the loss of a child, some financial disaster, business difficulties, domestic unhappiness or social embarrassment. It invariably responds to psychotherapy, but if it persists for longer than 3 months or if it presents any of the ominous attributes detailed above, it should be assessed in the same way as an endogenous depression and should be treated by a psychiatrist.

Watts[8] considers that, when recognized, most mild cases of endogenous depression without suicidal trends, agitation or delusions, can be treated successfully by the general practitioner with superficial psychotherapy twice weekly aided by symptomatic sedation, amphetamine stimulation, etc., until spontaneous recovery occurs, for the majority of mild depressive states are self-limiting.

It is true that the psychiatrically orientated practitioner can quite successfully treat some of his cases of mild endogenous depression with sedation, sympathetic encouragement, reassurance and explanation, and instil confidence that eventually recovery will take place; these are cases who are able to continue with their work without much difficulty. Patients who are incapable of work should be regarded as severe cases, however mild they appear to be, and I would emphasize that only the milder cases of depression should be treated by the practitioner who is not interested in supportive psychotherapy or who has not the time to see the patient twice a week over a period of months. Unlike the patient suffering from an anxiety state who looks forward to interviews with his family doctor and who seems to gain appreciably from his words of comfort and encouragement, the depressive patient shows little interest in psychotherapy as such. The patient insists that he is unfit and in need of help and demands repeated reassurance and sympathy. This discourages the doctor from attempting further treatment of a patient who, if not referred to a psychiatrist, may develop a chronic depressive state resulting in semi-invalidism or who, when the convalescent stage, the dangerous period of the depressive illness is reached, is advised by well-meaning friends and relatives to pull himself together and go back to work or to activities he enjoyed before. This results in an access of fear, self-reproach, hopelessness and futility which too often results in suicide. Unless the doctor recognizes the correct moment, urging the patient to do more than he is able to do can result only in tragedy. Psychotherapy of the family often does more for the patient than psychotherapy of his emotional state—the family must be trained and informed what to say and how to act. They must be given to understand that the patient's illness is a definite illness due to a complex disturbance of biochemical and endocrine equilibrium and is not due to lack of will power; that reassurance, encouragement and understanding will do more to assist the patient to recover than nagging criticism and the illogical senseless advice to pull himself together. It must be emphasized that constant vigilance may be necessary if the patient becomes worse, to protect him from self-harm. Understanding the endogenous nature of the illness by the patient often relieves him of his too frequent self-accusations of inferiority and self-reproach, and helps to remove the superadded neurotic features that so frequently tend to be associated with the depressive state.

HOW FAR DOES THE DEPRESSIVE STATE DEPEND ON PHYSICAL DISEASE?

Typical symptoms of an endogenous depression may be found in certain physical diseases, especially in individuals over 40. GPI must be excluded, as well as early cerebral tumours, cerebral arterio-sclerosis, uraemia, the effects of encephalitis and, in rare cases, myxoedema and pituitary diseases. On the other hand, any physical illness or physical disease may act as a precipitating factor of mental illness by lowering the resistance to stress in an individual temperamentally and constitutionally predisposed to depression. An attack of influenza or infectious hepatitis is a not uncommon precipitating cause of a persistent depressive state. In younger individuals pulmonary tuberculosis must be excluded. Depression lasting more than 10 days after childbirth, however mild, is a particularly important and serious condition and not infrequently leads either to suicide or to the young mother trying to injure the baby. It is essentially an endogenous condition and, if treated early, the prognosis is often excellent.

The practioner will be assisted in these cases if he remembers that the endogenous intrinsic factors, i.e. the basic constitutional predisposition to depressive states plays the major role, and physical and psychological factors play relatively minor roles in precipitating the persistent mild or the severe endogenous depression. Accepting that genetic and early childhood influences impose certain limitations on the ability of the individual to adapt himself to changing forces in his internal and external environment, it will be realized that some individuals are equipped from birth by reason of an innate stability to adjust themselves easily to trying circumstances, while others tend to break down under relatively minor stress. The importance of the environmental stresses in any individual depends largely on the meaning they have for the particular patient rather than on the system of values held by the family doctor, a point stressed by Dewan.[1] There are however some cases, fortunately rare, where the factors are essentially psychogenic and due to environmental difficulties and are lifelong and unmodifiable. Sometimes the problem is insoluble, as in the case of a chronically ill or difficult wife or husband or in the case of a disturbing mother-in-law situation. Again the inherent stability of the individual and a successful doctor-patient relationship may assist the patient in dealing with what seems to be an intolerable and unrelievable situation. It is necessary to remember that suicide can occur after ripe reflection for perfectly reasonable motives. The reasons may be practical, e.g. incurable disease, dishonour or ruin.[3]

THE TREATMENT OF DEPRESSIVE STATES OF OMINOUS TYPE

Electro-cerebral therapy, i.e. electro-shock therapy or electro-coma therapy, combined with non-convulsive therapy given

with intravenous pentothal, atropine and a relaxant and oxygen under pressure, has proved excellent for the attack itself, cutting short the depressive episode, and relieving the patient from distress and preventing the ever-present danger of suicide. Recovery occurs in 90% of the involutional depressions and in an almost equal percentage of acute, severe or mild endogenous depressive states. Contra-indications to this treatment are few and the risk to life in non-complicated cases negligible. Many patients can be treated economically as out-patients and are able to return to work in a matter of weeks. Many chronic endogenous depressions have been found treatable on an out-patient basis after a short period of hospitalization in a nursing home, and the temporary, but profound, memory disturbance that used to occur years ago after electro-shock therapy has been appreciably alleviated by the use of non-convulsive therapy following electro-shock therapy. There is no doubt that the high recovery rate with electro-cerebral therapy fully justifies its use, despite the fact that it may have to be repeated at intervals in certain recurrent cases of depression. Sometimes, especially in the younger age-groups and those involutional depressions that relapse rapidly after the first course of treatment and fail to respond to a second course of electroshock therapy, freedom from depression can be achieved by maintenance treatment, one a month, for a period of 6-12 months. This form of therapy tends to break the cycle of recurrent depression that seems to occur in a certain group of the manic-depressive disorders.

With regard to symptomatic treatment, a most useful form of medication for the anxiety, tension and insomnia complained of by the mildly depressed cases, is a sedative mixture of ¼ gr. of sodium Luminal and 5 gr. of sodium bromide; if there is undue restlessness, 5-15 m. of nepenthe may be added. This should be taken 3 times a day with 2 or 3 gr. of sodium Amytal at night combined with 2 or 3·25 mg. tablets of Largactil at night as well. Two tablets of Drinamyl should also be given on waking in the morning and at 3 p.m. All sedation should be prescribed to last for 3 days only, and re-prescribed twice weekly by the practitioner when he sees the patient for observation. The modern tranquillizers, apart from Largactil, which is especially indicated when obsessional features are marked, have been found in my experience to be of no value in cases of depression; in fact, in company with phenobarbitone, if given in a greater dosage than ¼ gr. 3 times a day, they tend to increase the depression rather than to relieve it. For these drugs to produce any tranquillizing effect in these conditions high dosages must be given and these often produce undesirable side-effects and have, on occasions, endangered driving ability and decreased the efficiency of mental functioning to a serious degree. A further warning must be given in relation to reserpine which, when used for states of anxiety and hypertension, has produced, in many cases who are constitutionally predisposed to depression, a serious depression often of suicidal type necessitating urgent psychiatric treatment such as electro-shock therapy. There is as yet no guarantee that even if given with dextro-amphetamine this tendency to depression will be prevented. According to Fullerton,[2] Meratran is of value in some cases of reactive depression where agitation is minimal and delusions are absent.

Endocrine treatment has not yet proved itself of value in the treatment of depression in the involutional period for any but a few cases. Continuous narcosis therapy may be of value in selected cases, but compared with those in which electro-cerebral therapy is used, the results of this treatment are poor and relapses frequent.

As in most medical and surgical diseases there is a group of cases that do not respond to ordinary methods of treatment and which tend to relapse or to recur and to remain chronic. Nearly every general practitioner has seen in his practice one or more psychiatric patients who suffer from a state of chronic depression, with or without severe anxiety or unrelieved agitation and mental anguish, who do not respond to any form of available psychiatric treatment, whose mental suffering is severe, and whose incapacity is profound as far as earning a living is concerned. In these cases, only when all other treatments have been tried and failed, should the operation of rostral leucotomy or selective cortical undercutting be considered. Ström-Olsen and Northfield[7] conclude that post-operative personality-changes have been negligible or slight after undercutting the orbital cortex. If in the opinion of four independent psychiatrists this treatment offers hope of ameliorating a chronic and intractable mental illness, then it should be recommended. In experienced hands the risk to life is so slight, the effects on the intelligence and character so minimal, that the relief of suffering granted to the patient envisaged by this procedure should not be denied.

Hypnosis and deep psycho-analysis are contra-indicated in most cases of endogenous depression. Claims that they will eliminate the tendency to attacks have not been proven. They are of value, as is the relatively superficial supportive and interpretative psychotherapy, in the neurotic depressions which occur in the sensitive, highly-strung, obsessional, perfectionistic personality-types who react excessively to the stresses and strains of everyday life with symptoms of depression and anxiety or psychosomatic conditions.

CONCLUSION

1. The recognition of the endogenous depressive state by the practitioner and early reference for psychiatric therapy results in a 90% recovery rate.

2. The mistaken diagnosis of anxiety neurosis and the symptomatic treatment of insomnia with hypnotics, loss of libido with testosterone, anxiety with a tranquillizer, excessive tiredness with amphetamine, without continued repeated observation and psychotherapy, even superficial, is a too frequent cause of suicide or prolonged semi-invalidism.

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VAN DIE REDAKSIE

ISOTOPE—NUWE DIAGNOSTIESE WERKTUIE

Dit is 'n ongelukkige feit dat baie van die hedendaagse vordering op die gebied van diagnose en behandeling buite die bestek van die algemene praktisyn val. Die gebruik van radio-aktiewe isotope by die opsporing en behandeling van siekte is 'n voorbeeld hiervan. Op hierdie dekade-oue gebied van mediese vordering, waar sommige van die mees basiese fisiologiese tegnieke en mediese behandelings tans verander word, is 'n volledig-toegeruste radio-aktiewe isotoop-hospitaaleenheid, met voldoende personeel, nodig. Alhoewel dit in Brittanje nog tot die onderrig-hospitale beperk is, kan dit nie meer lank wees voordat dit net so 'n noodsaaklike deel van die groot hospitaal sal wees soos die X-straal-departement nie. Die April-uitgawe van *The Practitioner* word geheel en al aan hierdie onderwerp gewy, en in 'n artikel waarin so 'n eenheid noukeurig beskryf word, is Stafforth van St. Thomas-Hospitaal, Londen, van mening dat dit 'n noodsaaklikheid geword het by 'n sentrum wat dienste lewer aan 'n stad met 'n bevolking van meer as 200,000.[1] Maar dit lyk onwaarskynlik dat die algemene praktisyn ooit 'n Geiger-telbuis in sy tas sal saamdra, of selfs een in sy spreekkamers sal aanhou. Dit sal vir hom voldoende wees om te weet waaroor die isotope handel.

Die beginsel om radio-aktiewe isotope vir diagnose te gebruik, is eenvoudig soos volg: Die isotoop van die grond-bestanddeel wat gebruik word (gewoonlik jodium, natrium of fosfor)—gekies omdat dit kenmerkende radiomagnetiese golwe uitstraal wat op 'n Geigertelbuis, of die sensitiewer sintillasietelbuis opgeneem kan word—word in die liggaam ingelaat en die ligging daarvan aangeteken. Byvoorbeeld, 'n radio-aktiewe isotoop van natrium (^{24}Na), wat in 'n aar in die voet ingespuit is, ‚registreer' 'n paar oomblikke later op 'n Geigertelbuis wat oor die lies geplaas is, en die snelheid waarmee die bloed vloei, word op hierdie wyse bepaal. Dit is hierdie beginsel om 'n grondbestanddeel te merk (deur 'n radio-aktiewe isotoop daarvan te kies) om die natuurlik-voorkomende hoeveelhede daarvan in die liggaam op te spoor, wat die metode so waardevol maak by versteurings van die skildklier. 'n Maat waarvolgens skild-klierwerking gemeet kan word, is die tempo waarteen jodied van die plasma na die klier beweeg, en waarteen tiroksien van die klier na die plasma en uiteindelik na die urien beweeg. Die metodes wat gebruik word, streef daarna om hierdie beweging deur middel van radio-aktiewe isotope ^{131}I en ^{132}I te meet. By die eerste metode word die ‚opname' ('n nuwe woord soos bv. ‚merk' en ‚opsporings-') van gemerkte isotope in die klier na inspuiting beraam, asook die ontruiming daarvan uit die bloedstroom en die hoeveelheid in die urien. Hierdeur kan 'n beeld verkry word van die mobiliteit van

EDITORIAL

ISOTOPES—NEW DIAGNOSTIC TOOLS

It is an unhappy fact that many of the present-day advances in diagnosis and treatment lie outside the scope of the general practitioner. The use of radio-active isotopes in the detection and treatment of disease is an instance in point. On this decade-old frontier of medical progress, where some of the most basic physiological techniques and medical treatments are being altered, a fully-equipped and fully-staffed radio-active isotope hospital unit is required. Although still restricted in Britain to the teaching hospitals, the time cannot be far off when it will become as essential a part of the large hospital as the X-ray department. The April number of *The Practitioner* is wholly devoted to the subject and, in an article specifically describing such a unit, Stafforth of St. Thomas's Hospital, London, holds that it has become a necessity in a centre serving a town with a population of more than 200,000.[1] But it seems unlikely that the general practitioner will ever pack a Geiger counter in his bag, or even keep one in his rooms. It wil suffice for him to know what the isotopes are all about.

The principle of using radio-active isotopes for diagnosis is simply this: The isotope of the element used (usually iodine, sodium or phosphorus)—chosen because it emits characteristic radiation which can be picked up on a Geiger counter, or the more sensitive scintillation counter—is introduced into the body and its locality recorded. For instance, a radio-active isotope of sodium (^{24}Na) injected into a vein in the foot 'registers' some moments later on a Geiger counter placed over the groin, and the velocity of the blood flow is thereby determined. It is this principle of labelling an element (by choosing a radio-active isotope of it) to trace its naturally-occurring quantities in the body, that gives the method its great value in disorders of the thyroid gland. A measure of thyroid activity is the rate of movement of iodide from the plasma to the gland, and of thyroxine from the gland to the plasma and finally to the urine. The methods employed aim at measuring this movement by means of the radio-active isotopes ^{131}I and ^{132}I. In the first method, the 'uptake' (a new word, like 'labelling' and 'tracer') of labelled isotope in the gland is assessed after injection, as well as its clearance from the blood-stream and the quantity in the urine. By this means a picture can be

jodium in die liggaam en, derhalwe, van die werking van die skildklier. Die tweede metode meet eenvoudig die hoeveelheid opsporingsjodium wat bv. 72 uur na inspuiting in die plasma aanwesig is (aangesien dit reeds deur die klier gegaan het). Dit word beweer dat 'n kombinasie van die twee tegnieke die juisste beeld verskaf.[2] By karsinoom van die skildklier is die isotope van jodium van minder waarde, alhoewel dit aan die hand gedoen is dat 'n Geigertelbuis uitwendig oor die liggaam gebruik kan word om metastatiese neerslae, wat gevind sal word op plekke waar die hoogste radio-aktiewe syfers verkry word, op te spoor.

Afgesien van die skildklier, was isotope waarskynlik van die grootste nut by die lokalisering van intrakraniale gewasse. Vinniggroeiende weefsels, ryk aan bloedvate, sal 'n gemerkte isotoop van fosfor (^{32}P) makliker konsentreer—en sal derhalwe 'n hoër graad van radio-aktiwiteit op die telbuis toon—as normale weefsels. Deur die telbuis op verskeie plekke op die skedel aan te wend, kan die ligging van die gewas geskat word volgens die graad van radio-aktiwiteit wat op verskeie plekke aanwesig is. 'n Ander metode is om die inhoud van die brein deur boorgaatjies met 'n breinaaldtoestel, wat aan die telbuis geheg is, te ondersoek. Radio-aktiewe isotope mag hier slaag waar kliniese en radiologiese pogings tot lokalisering misluk het.

Op die gebied van navorsing het hierdie metode bewys gelewer dat dit van besondere waarde vir die hematoloog is. Deur rooi bloedliggaampies met ^{32}P te merk en hulle dan in die bloedsomloop in te spuit, kan 'n betreklike akkurate bepaling van die bloedvolume verkry word deur hulle verdunning te beraam. As dit in 'n praktiese rigting ontwikkel word, mag hierdie metode 'n lang-gesogte oplossing vir die chirurg bied; 'n vinnige, eenvoudige en akkurate metode om die graad van bloedverlies te bepaal. By bloedoortappings mag hierdie merk van rooi bloedliggaampies waarskynlik die oplossing verskaf by moeilike gevalle van onverenigbaarheid. Deur 'n paar gemerkte selle in die pasiënt se bloedsomloop in te spuit en die radio-aktiwiteit dop te hou—dit val vinnig as die selle weens onverenigbaarheid ontbind—mag 'n goeie indeks van onverenigbaarheid verkry word.

1. Stafforth, J. S. (1957): Practitioner, **178**, 440.
2. Wilson, G. M. (1957): *Ibid.*, **178**, 423.

obtained of the mobility of iodine in the body and, therefore, of the activity of the thyroid gland. The second method simply measures the amount of tracer iodine present in the plasma (having already passed through the gland) at, say, 72 hours after injection. It is said that a combination of both techniques gives the truest picture.[2] In carcinoma of the thyroid the radio-active isotopes of iodine are of less value, although it has been suggested that a Geiger counter can be used externally over the body to detect metastatic deposits, which will be found in sites over which the highest radio-active indices are obtained.

Apart from the thyroid, isotopes have perhaps been most useful in localizing intracranial tumours. Rapidly-growing, highly-vascular tissues will concentrate a labelled isotope of phosphorus (^{32}P) more readily—and will therefore show a greater degree of radio-activity on the counter—than normal tissues. By applying the counter to various spots on the cranium, the site of the tumour can be gauged from the degree of radio-activity present at various sites. Another method is to probe the substance of the brain through burr holes with a knitting-needle device attached to the counter. Radio-active isotopes may succeed here where clinical and radiological attempts at localization fail.

In the field of research this method has proved of especial value to the haematologist. By labelling red blood-corpuscles with ^{32}P and then injecting them into the circulation, a fairly accurate estimation of the blood volume can be arrived at by assessing their dilution. If developed in a practical direction, this work may provide a long-sought-after key for the surgeon: a quick, simple and accurate method of determining the degree of blood loss. In blood-transfusion work, this labelling of red blood-corpuscles probably provides the answer in difficult cases of incompatibility. By injecting some labelled cells into the patient's circulation and watching the radio-activity—it drops rapidly if the cells disintegrate owing to incompatibility—a good index of incompatibility may be obtained.

1. Stafforth, J. S. (1957): Practitioner, **178**, 440.
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A REPORT ON THE MANAGEMENT OF A BLOOD-VESSEL BANK

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Vascular grafting is widely considered to be an achievement of the present generation; so it is humbling to learn that Carrell was awarded the Nobel Prize in 1912 for his work on the transplantation of blood vessels. Already in 1907, 1908 and 1910 he had anticipated many of the needs of a vascular bank and clearly saw the uses to which it could be put. He was, however, ahead of his time, and the application of the principles of his pioneer work was delayed until the advent of chemotherapy and the development of anaesthetic techniques which made safe thoracic surgery possible. There was no significant practical advance in vascular surgery until 1949, notwithstanding the intervention of the two world wars with the immense opportunities they offered for vessel replacement. In that year Gross, Bill and Pierce described a method of storing homografts in a nutrient medium known as Tyrode's solution. With these grafts they successfully bridged the gaps caused by excision of long-coarcted segments, of the thoracic aorta. By 1951 Gross had performed 19 such operations. In the field of peripheral arterial grafting, Prof. Charles Rob of St. Mary's hospital has been in the forefront and his numerous publications have done much to clarify the problems of this type of surgery. The feasibility of thoracic aortic grafting, even in the absence of a coarctation, was demonstrated by

the experimental work of Blakemore and Lord (1945), Gross and Hufnagel (1945) and Hufnagel (1947 and 1949). In 1951 Lam and Aram reported a temporarily successful by-pass graft of an aneurysm of the thoracic aorta in man, but the patient died 3 months later from infection of the aneurysmal sac. Success was imminent and, in 1953, De Bakey and Cooley reported the first survival in man after resection of a fusiform aneurysm of the descending thoracic aorta and, in 1954, a case of successful grafting of the distal aortic arch. The treatment of thoracic aortic aneurysms by excision and grafting is now in the realms of practical surgery and, with the development of methods of protecting the viability of the spinal cord, liver and kidneys, should in time become a reasonably safe procedure. All these advances depend upon the establishment of a reliable and safe vascular bank where sterile grafts may be stored ready for use whenever so desired or, alternatively, upon the discovery of fabric materials which possess all the inherent advantages of homografts.

This paper is based upon experiences derived from the establishment of an arterial graft bank at the Johannesburg Hospital and experimental work on the grafting of the aortae of dogs. This has been done in the Department of Surgery, University of the Witwatersrand, with the aid of a grant from the Council for Scientific and Industrial Research of South Africa.

REQUIREMENTS OF A VESSEL BANK

The following requirements are necessary for a bank to function at maximum efficiency:

(*a*) an adequate supply of material must be on hand. This demand requires not only that a certain number of grafts should be stored, but also that similar vessels of varying length and calibre should be available to fit varying host vessel dimensions. Also it is necessary to be able to replace bifurcation areas with similar grafts, so that various types of aortic bifurcation, innominate artery bifurcation and common-femoral bifurcation grafts should be stocked. Thus, even though a single body may supply up to 10 or 12 divided grafts, material from bodies of at least 6 different sizes should be available at any one time.

(*b*) The available material must be free of contamination or infection by pathogenic organisms. A successful grafting operation ruined by infection is disaster indeed.

(*c*) The quality of material supplied should approximate as closely as possible to the normal fresh vessel. This implies that the graft, even after months of storage, should show minimal histological changes in its walls and that its elasticity and strength should be unimpaired.

ORGANIZATION OF A VESSEL BANK

It is not intended here to cover the many technical, legal and administrative facets of the organization of a bank. These are considerable, and are clearly enumerated in a very valuable report by a committee composed of Lord, Gross, Hufnagel and Lazzarini which was published in *Circulation* early in 1956. It is intended to confine the present article to the steps taken in the Johannesburg Hospital to satisfy the 3 previously enumerated requirements of a bank.

METHODS OF STORAGE

Many methods of storing arterial homografts have been devised. Levin and Larkin (1909) kept their material in formalin, but this method has the disadvantage of rendering the grafts tough and inelastic. Gross, Bill and Pierce (1949) stored grafts in a balanced salt solution whilst Swan (1952) utilized a frozen nutrient medium. These methods maintain good-quality material for comparatively short periods and, because of the high wastage (Pierce 1952), are unsuitable where access to graft material is limited. Quick freezing and storage at a temperature of —79°C (Hufnagel and Eastcott 1952) is a method which has been widely utilized and is efficient in maintaining the quality of grafts for an indefinite period of time. Freeze-drying (Marrangoni and Cecchini 1951) allows grafts to be stored indefinitely at room temperatures. For the purposes of storing material for human use, we have utilized the latter two methods.

Deep Freeze: An efficient well-insulated deep-freeze refrigerator is capable of maintaining a temperature of about —15° to —20°C. Hufnagel (1947) practised the storage

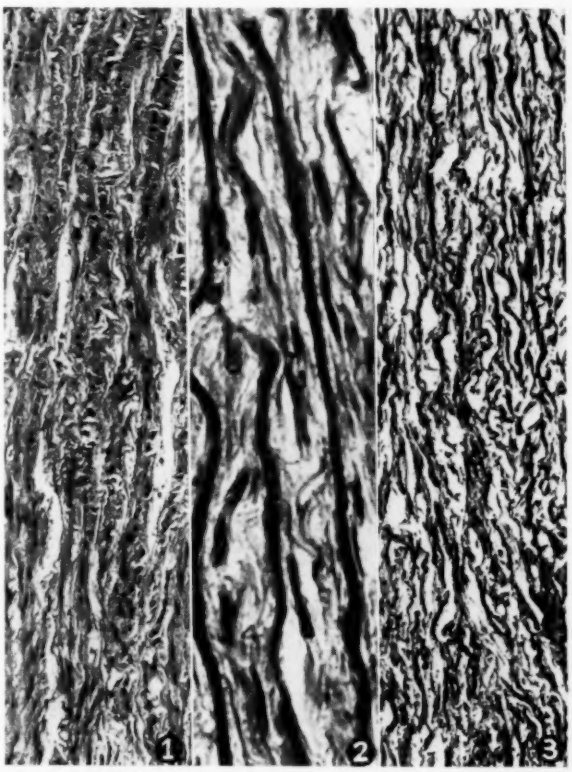


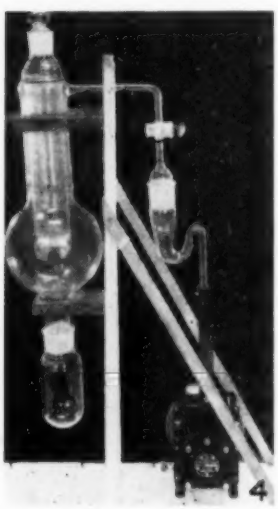
Fig. 1. Microscopic section of the wall of an aorta after 8 months storage at a temperature of —70°C. Note the normal architecture. Stained with H. and E. Magnification X 150.
Fig. 2. Microscopic section of the wall of an aorta reconstituted from the freeze dried state after 6 months storage. Magnification X 600. Stained with H. and E.
Fig. 3. Microscopic section of the wall of a reconstituted freeze dried aorta stained to show up the elastic fibres. No fragmentation has occurred. Magnification X 150.

of grafts at these temperatures, but found it to be less effective than storage in a solid carbon-dioxide chamber, where temperatures of —70°C were obtainable (Hufnagel and Eastcott 1952). At this temperature, grafts retain their histological features indefinitely (Fig. 1). Unfortunately, supercooling is well tolerated by bacteria (Weiser and Osterud 1945) and this necessitates that grafts must be sterile when placed in the bank. We have recovered an original *Staphylococcus albus* from a contaminated artery cultured after 8 months' storage at a temperature of —70°C. A solid carbon-dioxide bank is expensive to operate and, in order to prolong the 'life' of the carbon dioxide, it has been found economical to purchase a deep-freeze unit in which the CO_2 snow is kept. Even so, the cost to the hospital of replenishing the refrigerant has been about £30 per month.

Freeze-Drying: The process of freeze-drying entails the passage of the water content of the frozen graft directly from the solid to the gaseous state (sublimation). If this is done at a temperature of —70°C the proteins are not denatured by the process, and when rehydrated the material regains all its physical properties. Freeze-drying has long been used in the food industry, and Marrangoni and Cecchini (1951) applied the method to vascular grafts. Strong (1954) and Hufnagel, Rabil and Reed (1954) have shown that the method is efficient and reliable. The grafts can be stored at room temperature and when rehydrated regain their histological (Figs. 2 and 3) and physical properties.

The method of freeze-drying we have adopted is based upon that described by Eastcott, Holt, Peacock and Rob (1954). The equipment, somewhat modified from the original (Figs. 4 and 5), was made by Messrs. Laborglass of Johannesburg. The vacuum pump used is a Cenco type Hy-Vac pump capable of producing a vacuum of 0·03 mm. of mercury during drying. Three or four test-tubes can be inserted into the drying chamber, and these usually contain between 20 and 30 g. of 'wet' graft material. The grafts are placed in the apparatus in the frozen state and evacuation commences immediately. The latent heat of vaporization is derived from the grafts, which thus remain frozen. As the water content decreases and the rate of sublimation slows, the temperature of the graft rises towards that of its surroundings, but in other respects its composition remains constant. With our equipment it has been found unsatisfactory to freeze-dry more than 40 g. of material at a time. During 8 hours of primary drying the weight of the material should decrease by 70-75%, and most of the water removed should be trapped in the form of ice on the surface of the condensing chamber. At the end of 8 hours the graft should be slightly shrunken and dead white in colour; it should lie free in its container. The test-tubes are then placed in a vacuum desiccator containing phosphorus pentoxide. If the primary drying has been efficient, the original weight of material is reduced by only a further 5-10% during the 7 days of the secondary stage of drying. The total amount of water extracted should amount to 80-85% of the 'wet' weight of the material. The grafts are then placed in completely dry sterile test-tubes. Closely-fitting rubber corks are inserted and the test-tube is evacuated with a vacuum pump by means of a needle inserted through the cork. After removal of the needle, the test-tube is finally sealed by dipping the corked end into molten paraffin-wax. The graft can then be kept for an indefinite period at room temperature.

Freeze-drying does not sterilize the graft; any contaminating organisms are preserved and regain vitality when rehydrated. They, too, are dried and, when rehydrated, absorb the solution into their substance.



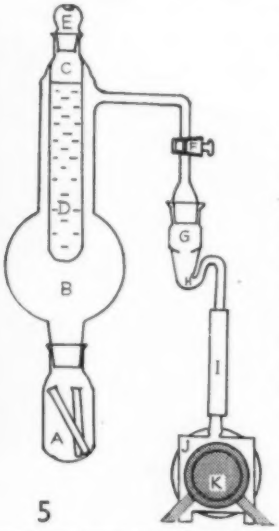


Fig. 4. Equipment used for dehydrating frozen blood vessels. (After Eastcott, Holt, Peacock and Rob.)

Fig. 5. Diagram of freeze-drying equipment (after Eastcott *et al.*, 1954). A=Graft container. B=Vacuum chamber. C=Condensor chamber (water vapour condenses on outer wall as ice). D=Mixture CO_2+alcohol. E=Fenestrated glass stopper. F=Vacuum break. G=Phosphorus-pentoxide chamber. H=Goose-neck (prevents possibility of liquefied phosphorus pentoxide entering vacuum pump). I=Rubber pressure-tubing. J= Vacuum pump. K= 1 H.P. motor.

AN ADEQUATE SUPPLY OF MATERIAL

The supply of material is immediately limited by the difficulties of removing vessels from a suitable subject within a short time of death. It is recommended that the donor should be under 40 years of age, though it is a common observation that this limit does not necessarily exclude the presence of arterial degeneration. If atheroma, medio-necrosis or syphilitic aortitis is found, the material must be discarded. The cause of death is also a limiting factor and, apart from degenerative vascular diseases, certain infectious diseases such as serum hepatitis, syphilis, malaria and generalized sepsis, render the material unsuitable. The ideal donor is therefore a young healthy individual whose death was sudden and accidental.

The chief limiting factor in this country is the restrictions governing necropsies and removing tissue within the desirable limit of 6 hours of death under present legislation. Apart from difficulties of organization, demanding as it does the closest cooperation of pathologist and graft-bank personnel, permission has to be obtained from a responsible person to remove the required tissue, and in cases of violence this is seldom possible within a few hours of death.

It has been shown by tissue culture that the cells of the arterial wall are scarcely viable if cultured more than 6 hours after death, though Dieterling, Parshley and Blunt (1953) have shown that the viability may be prolonged up to 24 hours if the body is rapidly refrigerated. More im-

portant perhaps than the impaired viability of cells is the damage that may be done to the arteries by the growth of contaminating organisms.

We have experienced the very greatest difficulty in obtaining grafts from 'ideal' donors and have had to supplement our material from other sources. Grafts obtained from a young individual who has died from a primary liver carcinoma have been used. People dying from rheumatic valvular disease and congenital heart disease are considered suitable. Even so, the difficulties experienced in obtaining a sufficient stock of material have been considerable and the bank has, of necessity, operated without the wide variety of selection which is desirable. In the 18 months since the establishment of the bank, vessels have been obtained from only 9 donors.

When the tissues are removed from the body a specimen of blood should be obtained for a Wassermann examination. This blood may not be suitable for the test, and in 2 of our cases no result was obtainable. A selection of vessels should be sent for bacteriological examination, and others should be immediately inserted into formalin to be sectioned for evidence of arterial disease. A segment of ascending aorta, the area of the coeliac axis, and a peripheral vessel such as the politeal artery are the usual specimens sent for bacteriological and histological examination. These areas are representative of the common sites affected by arterial disease and are themselves not suitable for grafts. If their structures is normal, the whole arterial tree can be safely used. All our material was obtained from young individuals and arterial disease was never found.

STERILITY OF GRAFTS

Arteries are removed from a donor with a generous amount of perivascular tissue. If, for any reason, the material cannot be cleared immediately it should be placed in sterile test-tubes, which are sealed and immersed in a syrupy mixture of CO_2 'snow' and absolute alcohol contained in a gallon thermos flask. Rapid freezing ensues and the grafts can then be transported at comparative leisure to a place where they may be prepared.

The grafts are unfrozen in normal saline and are treated with strict asepsis under operating-theatre conditions. All perivascular tissue, and as much adventitia as possible, should be removed. Branches should be carefully preserved and not avulsed. They should be cut cleanly across about $\frac{1}{4}$ inch from their parent vessel. They should not be tied at this stage, for with subsequent freezing the branch may fracture at the site of ligature and a false sense of security is engendered. The vessels should be cut into appropriate lengths, keeping in mind the uses for which they will be required. They are then sealed in separate sterile test-tubes and are placed in the bank at a temperature of between —60 and —70°C.

It has been our practice to remove grafts in as cleanly and sterile a manner as possible. However, the conditions in the post-mortem rooms, where it has been necessary to work, have been so unfavourable that only one of the 9 sets of grafts obtained has been free from contamination. The contaminating organisms found are listed in Table I. On 4 occasions Petri dishes containing a blood-agar medium have been exposed to the air in the environs of the necropsy and organisms have been cultured. There has been no definite correlation between the contaminating organisms and those obtained from the air. There has been a much closer relationship with cultures from smears taken from the skin of the donor and from peritoneal fluid. The skin and the intestine (even though the abdominal aorta is removed extra-peritoneally) are therefore the chief sources of contamination. Where grafts are difficult to obtain, contamination is a major disaster, and if this necessitated discarding the grafts the work of the vessel bank would cease. This is not solely our experience alone; indeed it is common cause that contamination is the greatest difficulty inherent in the use of homografts. As a consequence, it has been necessary here, as in other countries, to experiment with various methods of sterilization.

TABLE I. CONTAMINATING ORGANISMS OF THE 9 SERIES OF GRAFTS OBTAINED

Grafts	*Organism*
A	Staphylococcus albus
B	Coliform Bacilli, Staphylococcus albus, Streptococcus viridans, diphtheroid bacilli.
C	Sterile
D	Staphylococcus albus
E	Staphylococcus albus and haemolytic streptococci
F	Staphylococcus aureus
G	Staphylococcus albus
H	Bacillus proteus and staphylococcus albus
I	Coliform bacilli, Staphylococcus albus

Meeker and Gross (1951) advocate the technique of electron-beam sterilization as used in the food and chemical industry, and Brunnen (1953) has confirmed its efficacy. Highvoltage cathode-ray irradiation and gamma-ray irradiation have also been used satisfactorily (Lord, Gross, Hufnagel and Lazzarini 1956), but the expense of purchasing such equipment is prohibitive to all but the most well-endowed medical centres.

Chemical agents have also been widely used. Lord and his colleagues recommend the use of ethylene oxide (Phillips and Kaye—1949) and beta-propriolactone, but neither is ideal in that their effectiveness is limited and they are liable to produce histological changes in the vessel wall. In addition, ethylene oxide is explosive when mixed with air in all proportions from 3 to 80%. (Lord *et al.*, 1956).

Levin and Larkin (1909) suggested that immersion in formalin would not impair the strength of the vessel wall and would rapidly destroy all contaminants. However it has been found (Ross, 1954) that early calcification is the rule and, in any case, a formalinized graft is stiff and hard and difficult to insert satisfactorily, particularly in the presence of disproportion between the calibre of the vessels of host and donor. Ross (1954), following the suggestion of, Brunner (1953), has modified this technique and has immersed grafts for short periods (optimal period 18 hours) in a 4% formaline solution of pH. 5·6. He found that this was sufficient to sterilize all his experimentally contaminated material. These grafts were placed into the abdominal aortae of dogs and showed no calcification up to 152 days after insertion. We have used this technique experimentally and confirm the adequacy of sterilization, but find the loss of elasticity of the grafts to be a serious disadvantage. The technique of suture is less satisfactory when a 'stiff' graft is used and, more important, there is great difficulty in selecting a calibre to match that of the host vessel because, though they may correspond when anastomosed between clamps, there is often a marked narrowing at the site of graft when

the elastic host-vessel is distended by the pressure of blood. This is a serious disadvantage, particularly with peripheral vascular work.

All these methods were considered either to be impracticable, because of lack of equipment readily available to us, or else to affect grafts adversely and so impair their quality. It was noted both with human donors and with experimental animals that the organisms were invariably sensitive to one or other antibiotic as tested by *in vitro* culture. In collaboration with Mr. P. Roux of the Bacteriology Department, South African Institute for Medical Research, 20 grafts were experimentally contaminated with a mixed growth of *Staphylococcus albus* and *Streptococcus viridans* and, after exposure to room temperatures for an hour, were immersed in the deep freeze. A week later the grafts were removed and immersed in a solution containing the appropriate antibiotic at a temperature of 0-5°C. Five grafts were removed from the solution, irrigated with saline

TABLE II

Graft	*Contaminant*	*Effective Antibiotic*	*Growth after Deep Freeze*	*Treatment*	*Culture*
1 A	Non-haemolytic strept.	Aureomycin +++ Terramycin +++	Non-haemolytic strept.	Freeze-dry + Antibiotic	Sterile
1 B				Freeze-dry + Normal saline	Non-haemolytic strept.
2 A	*Staph. aureus*	Chloromycetin +++ Erythromycin +++	*Staph. aureus*	Freeze-dry + Antibiotic	Sterile
2 B				Freeze-dry + Normal saline	*Staph. aureus*
3 A	*Staph. albus*	Chloromycetin +++ Erythromycin +++	*Staph. albus*	Freeze-dry + Antibiotic	Sterile
3 B				Freeze-dry + Normal saline	*Staph. albus*
4 A	*B. proteus*	Streptomycin ++	*B. proteus* +	Freeze-dry + Antibiotic	Sterile
4 B			*B. subtilis*	Freeze-dry + Normal saline	*B. proteus* + *B. subtilis*
5 A	Haemolytic strept.	Penicillin +++ Aureomycin +++ Achromycin +++	Haemolytic strept.	Freeze-dry + Antibiotic	Sterile
5 B				Freeze-dry + Normal saline	Haemolytic strept.
6 A	*B. subtilis*	Terramycin +++ Erythromycin +++ Achromycin +++	*B. subtilis*	Freeze-dry + Antibiotic	Sterile
6 B				Freeze-dry + Normal saline	*B. subtilis*
7 A	*B. proteus*	Terramycin +++ Achromycin +++	*B. proteus*	Freeze-dry + Antibiotic	Sterile
7 B				Freeze-dry + Normal saline	*B. proteus*
8 A	*B. coli*	Chloromycetin ++ Neomycin +	No growth	Freeze-dry + Antibiotic	Sterile
8 B				Freeze-dry + Normal saline	Sterile
9 A	*B. coli*	Chloromycetin +++ Terramycin +++	No growth	Freeze-dry + Antibiotic	Sterile
9 B				Freeze-dry + Normal saline	Sterile
10 A	*B. asiaticus*	Streptomycin +++ Terramycin +++	*B. asiaticus*	Freeze-dry + Antibiotic	Sterile
10 B				Freeze-dry + Normal saline	*B. asiaticus*

dried and replaced in the deep freeze after ½ hour, 5 after 1 hour, 5 after 2 hours, and the remainder after 3 hours. A week later all grafts were cultured by immersion in nutrient broth. A scanty growth of the contaminants was obtained from 3 of the grafts immersed for ½ hour, 1 immersed for 1 hour, 2 immersed for 2 hours and 1 immersed for 3 hours. It was concluded that the method was unreliable in producing sterility of grafts and was dangerous in that exposure to room temperatures for prolonged periods of time had a deleterious effect upon the physical properties of grafts.

The reasons for the failure of sterilization by this method were considered to be:

(*a*) During the short times of exposure to the antibiotic it is unable to penetrate into the substance of the vessel wall where organisms might be present.

(*b*) With long periods of exposure at temperatures which allow the antibiotic solution to remain fluid, the graft deteriorates.

It was considered that these disadvantages would be overcome if the graft were first freeze-dried at a temperature of —70°C and then rehydrated with an antibiotic solution. In this way the contaminating bacteria are dehydrated and both graft and organism will rapidly absorb the antibiotic solution into their substance. Twenty grafts were contaminated with a mixed growth of *Staphylococcus albus* and *Streptococcus viridans* in the same way as previously described. After 1 week in the deep freeze the grafts were dehydrated (the process of primary and secondary drying lasts a week) and were then rehydrated with the appropriate antibiotic solution. Rehydration occurs in from 15 to 30 minutes. After a further week in the deep freeze all grafts were cultured and all were sterile.

A further series of experiments was then conducted in which 10 graft segments were contaminated with varying types of bacteria supplied by Mr. Roux. After a period in the deep freeze small segments of each were cultured. In 8 instances the original organism was recovered, 2 being apparently rendered sterile by deep freezing alone. The 10 grafts were then divided into equal segments and all were freeze-dried. One half of each graft was then rehydrated with an appropriate antibiotic solution whilst the other halves were rehydrated with sterile normal saline. After a week all 20 segments were cultured in a nutrient broth. The 8 grafts still contaminated grew the original organism whereas the treated grafts were sterile. The results of these experiments are summarized in Table II.

As a result of this series of experiments, it was decided to apply the method of sterilization to human homografts. Since then 11 arteries have been so treated. All these grafts have been effectively sterilized and 7 have been inserted into humans without subsequent infection at the operation site. These results are summarized in Table III.

The obvious practical procedure would be to culture samples of the contaminated graft at the time of collection and immediately to freeze-dry them so that they may be stored in the dehydrated condition. Rehydration with the appropriate antibiotic solution would then be done immediately before insertion of the graft. This has not yet been done as it was felt that, at this early stage, it should be confirmed that grafts had been effectively sterilized during rehydration. As more cases are done it is anticipated that the simpler procedure will be adopted.

QUALITY OF MATERIAL

Were it not for the difficulty of obtaining adequate supplies of material and the problems of sterilization, there would be little need for a search for alternative prostheses. These difficulties have been present from the start of practical vascular grafting and, as early as 1947, Hufnagel, in 15 dogs, described the experimental use of a plastic tube. He originally used methyl methacrylate (Lucite). Since then many different fabrics have been recommended; Voorhees, Jaretzki and Blakemore (1952) have used Vinyon 'N' cloth, Hufnagel (1955) and Rob and Eastcott (1954) tried Orlon 81 fibre, whilst woven Nylon and Dacron have also been successfully inserted into the aorta. It is too early to say whether fabric grafts will displace homografts in arterial grafting; certainly for aortic grafting the method is practicable but it is my

TABLE III. SUMMARY OF HUMAN GRAFTS STERILIZED BY FREEZE-DRYING AND REHYDRATION WITH ANTIBIOTIC SOLUTIONS

Graft	*Contaminant*	*Antibiotic sensitivity*	*Use*
B 2	Coliform bacilli *Staph. albus*	Aureomycin ++ Tetracycline +	By-pass graft of innominate aneurysm
B 1	Diphtheroid bacilli		Coarctation aorta
E 1	*Staph. albus* and	Penicillin +++ Streptomycin +++	Coarctation aorta
E 4	Haemolytic streptococcus	Penicillin +++ Terramycin +++	By-pass popliteal aneurysm
F 1	*Staph. aureus*	Penicillin + Terramycin +++	—
G 1	*Staph. albus*	Penicillin +++ Streptomycin +++	By-pass femoral artery thrombosis
G 2			—
H 1		Aureomycin +++	—
H 3	*Staph. albus*	Penicillin +++ Neomycin +++	—
H 4			Coarctation aorta
H 5			Replace severed popliteal artery

opinion that fabrics cannot compare with homografts as regards the technical aspects of insertion. It is an advantage to use a material possessing an elasticity comparable with that of the host vessel so that their calibres will match whether collapsed or distended. Also it is considered essential, particularly when working with small vessels, that an exact everting junction be fashioned so that the inner lining shall be as smooth as possible at the line of anastomosis. Irregularities of intima, with their tendency to produce eddies,

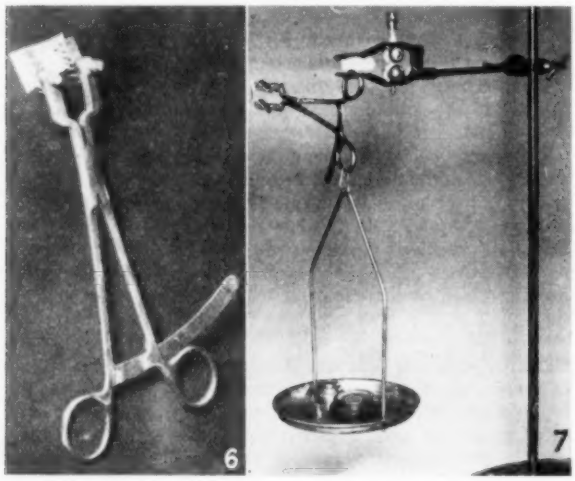


Fig. 6. Instrument designed to test the elasticity of arterial grafts. By separating the blades the amount of stretch can be directly estimated on the measured rule close to the handles. The needles which transfix the graft are carried on pivoted arms which remain parallel throughout the test.
Fig. 7. Method of testing the amount of retraction of a graft after a given stretching force has been applied and of assessing the disruption force. (See text.)

favour coagulation and militate against success. For these reasons, a graft bank should aim at the production of normally elastic grafts whose tensile strength is unimpaired and whose suppleness allows an everting technique to be used.

In order to test the elasticity and strength of vessels stored and treated in different ways, I designed an instrument which was made by Mr. D. Smith of the Department of Surgery (Fig. 6). A segment of graft is firmly flattened on a cork board by means of a metal strip slightly less than 1·5 cm. wide and is then transfixed with the 7 needles carried on each of the swivelling arms of the instrument. The arms are adjusted to lie parallel by contact with the metal strip used to flatten the vessel so that the included segment is exactly 1·5 cm. in length. The elasticity of the vessel can be tested by manually separating the handles until considerable resistence is sensed, and the stretch is measured directly on the rule. The elasticity may be expressed as a percentage of the original length. The same instrument may be used for a rough test of the strength of the graft. After transfixion of the segment, the instrument is mounted on a retort stand and a scale is hooked to the lower handle (Fig. 7). Gram weights are gradually added until the needles tear through the graft. By comparing the weights needed to cause this, before and after different processing of adjacent strips of

TABLE IV. RESULTS OF TESTS FOR STRETCH AND DISRUPTION OF SEVERAL TYPES OF HOMOGRAFT (ADJACENT STRIPS OF THE SAME HUMAN AORTA)

	Stretch Percentage of original length	*Disruption Force (in gram)*
Fresh Graft	80%	1,100
Deep Frozen	80%	1,000
Freeze Dried	80%	1,100
Formalinized (Ross)	33%	950

the vessel, it is possible to obtain a rough measure of the effect of that treatment on the strength of the graft. The results of an experiment in which adjacent strips of the same human aorta were treated by freeze drying, deep freezing and formalinization (Ross) are listed in Table IV.

If an excessive stretching force is used the graft will not retract to its original length, probably as a result of disruption of elastic fibres. Fig. 8 presents in graph form the results of an experiment where progressively increasing weights were used to stretch a fresh segment of aorta and an adjacent segment of the same vessel treated by immersion for 18 hours in Ross formalin solution. After measuring the stretch produced by each force, the

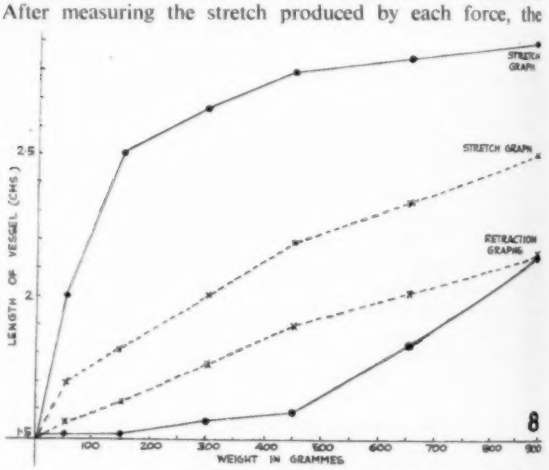


Fig. 8. Stretch and retraction graphs obtained from experiments on adjacent strips of aorta before and after treatment with Ross' formalin solution. Continuous line = fresh artery. Interrupted line = formalinized artery.

weights were removed and the vessel allowed to retract. The fresh vessel (1·5 cm. long) retracted fully after being stretched 1 cm. by a weight of 150 g. Heavier weights than this damaged the elastic fibres and the length of the segment did not return to normal. With a force greater than 450 g. the deleterious effect was accelerated. The formalinized graft showed impaired elasticity not only in its lessened stretch but also in that its retractability was affected by comparatively light weights. With weights almost sufficient to cause disruption of the arteries (900 g.), the effect on retractability was the same in both cases. Similar tests on blood vessels exposed to room temperature for several hours have shown that it is the retractability which is chiefly affected, whilst arteries treated by freeze-drying or deep-freeze react in an almost identical manner to the normal fresh vessel.

In order to compare the fate of the variously processed

TABLE V

Experiment	*1st Graft*	*2nd Graft*	*3rd Graft*	*Survival*	*Result*
1	Deep freeze	Formalin (Ross)	—	Still alive 25 months	All pulses present
2	Deep freeze	Formalin (Ross)	—	Killed after 1 year	Patent. Endothelium smooth
3	Deep freeze	Formalin (Ross)	Autogenous	Killed after 6 months	Patent. Graft 2 disproportion persists. Endothelium irregular.
4	Formalin (Ross)	Freeze dried	—	Paraplegic on 3rd day. Died 4th day	Clot on narrow proximal anastomosis
5	Deep freeze	Freeze dried	Autogenous	Killed after 6 months	Patent. Endothelium smooth
6	Deep freeze	Freeze dried	Autogenous	Killed after 9 months	Patent. Endothelium smooth
7	Deep freeze	Freeze dried	Autogenous	Killed after 9 months	Patent. Endothelium smooth

grafts after insertion into animals, an *in vivo* experiment was tried. A 3-inch segment of the abdominal aorta of dogs is excised. Continuity is restored by anastomosing two or three segments of different grafts with everting sutures. With the triple grafts the extra segment has been a short length of the vessel excised from the host (autograft) and intended as a control. Seven such experiments have been done, the types of graft inserted being summarized in Table V.

This is a small series made necessary by the limitation of accommodation available for long-term survival experiments. The results have been highly satisfactory in 4 of the 6 dogs examined at necropsy (Fig. 11). The one total failure was due to a thrombus forming on the anastomosis between the host's and the formalinized vessel. The lower limb pulses, present post-operatively, disappeared during the second post-operative day. Secondary extension of the clot, both proximally and distally (Fig. 9), caused paraplegia and death. When the clot was cleared at necropsy (Fig. 10) it was seen that the channel was markedly narrowed at this anastomosis due largely to disproportion between the calibre of the vessels of host and donor. Though dog 3 survived in good condition for 6 months with palpable femoral pulses (a systolic murmur was always audible over the graft), the appearances were unsatisfactory at necropsy. The formalinized graft was dilated (Fig. 12) and the endothelium irregular. This was due to deposition of fibrin within the puckered crevices adjacent to the anastomoses with the adjacent

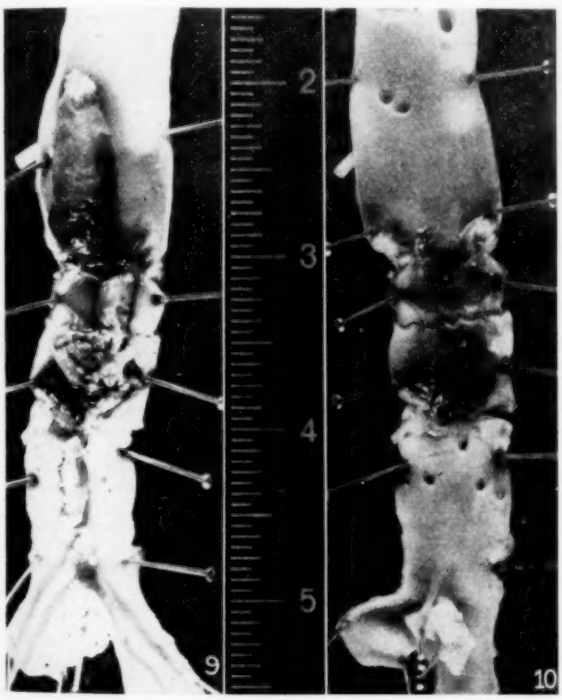


Fig. 9. Abdominal aorta of dog who died 2 days after a double graft had been inserted (see text). The clot was adherent to the proximal anastomosis (between host and formalinized graft). Secondary clot had extended proximally to the level of the renal arteries and distally into both common-iliac arteries. (Clot in iliac arteries has been outlined for clarity.) Scale in inches.

Fig. 10. Same specimen as Fig. 9 after removal of the obstructing clot. Note the marked narrowing of the most proximal anastomosis. The clot was most firmly adherent here.

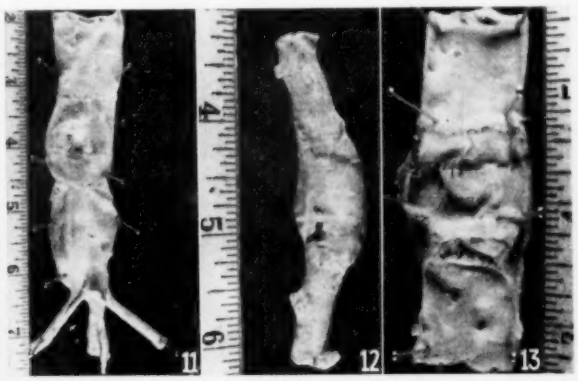


Fig. 11. Abdominal aorta of dog killed 1 year after insertion of double graft below the level of the renal arteries. No vestige of clot was present, the lines of anastomosis were smooth. A technically exact grafting experiment had been done. Scale in inches.

Fig. 12. External view of packed abdominal aorta removed from a dog 6 months after insertion of a triple graft (see Table V). The lines of the anastomosis are obscured by fibrous tissue covering. It is the central segment of the graft which forms the dilated area.

Fig. 13. Same specimen as Fig. 12 after longitudinal incision. The proximal and distal grafts are satisfactory. The central (formalin) graft was disproportionately large and the final result was unsatisfactory. The clot in the crevices has been removed.

grafts (Fig. 13). In this case an attempt had been made to compensate for the lack of elasticity of the formalinized graft by utilizing a slightly larger-calibre vessel than those of the other 2 grafts. This made the anastomosis technically unsatisfactory and resulted in narrowing of the junctions, with relative dilatation of the formalinized graft segment. The persistent systolic murmur heard over the graft indicated that turbulence resulted.

From these experiences, one feels that technical errors are far more likely to occur with rigid or relatively indistensible grafts than with normally elastic vessels. Provided an exact union is made, the results with homografts, however treated, with autografts or with fabrics, are comparably good when placed in a large vessel such as the aorta. Failures are due to technical errors and these are less liable to occur with normally elastic homografts than with any other material. The smaller the calibre of the host vessel the greater the importance of exactly matching the calibre, and consequently the more important it is to use material of perfect quality.

SUMMARY OF GRAFTS USED

Material has been obtained from 9 adult bodies. From these, 42 grafts of various sites, lengths and calibres have been prepared. No graft whose sterility has been suspect has been inserted into a human patient, and no case of infection has been reported. Several surgeons have performed the operations, chief amongst whom is Mr. A. Lee McGregor, who has been responsible for the insertion of most of the peripheral-vessel grafts. In all, 21 grafts have left the bank destined for human use. On 3 occasions the vessels were thawed, but insertion was found to be impracticable and the material was discarded. Two freeze-dried aortic segments have been sent to Durban, where they are being held in readiness should a long coarctation of the aorta be encountered. Sixteen grafts have been inserted, 4 by thoracic surgeons and 12 for peripheral vessels. Descriptions of some of these operations have already appeared in the South African medical press, but on the whole our experience is too limited to warrant discussion. It is upon the late results that the technique of arterial grafting will stand or fall.

Late in 1954, a Peripheral Vascular Unit was formed at the Johannesburg General Hospital under Mr. A. Lee McGregor. From this the need for a vascular bank arose, and it was Prof. W. E. Underwood who obtained from the Transvaal Province the authority and the money to start the project. It was his endeavours that made this experimental project possible, and I gratefully acknowledge the essential role which he played. Mr. D. I. Smith, of the Department of Surgery, has done all the numerous 'running repairs' to our equipment and his services have been of the greatest value. Mr. H. du Toit has taken an active part in that he has been responsible for the collection of 4 sets of grafts and has been of help in the clearing of vessels and in their delivery to the operating theatre. Mr. A. Leonsins was concerned with the purchase of 2 deep-freeze machines and ordered the Pyrex test-tubes for storing the grafts. Without the skilled help of Mr. P. Roux, M.Sc., of the Department of Bacteriology, South African Institute of Medical Research, the bank could not have functioned.

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CHROMOBLASTOMYCOSIS

CAUSED BY THE SIMSON SPECIES OF HORMODENDRUM

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In 1943 Simson, Harington and Barnetson[1] isolated a new species of Hormodendrum from a South African case of chromoblastomycosis. The species was described, though not named, and Carriòn[2] confirmed its identity with an isolate made by O'Daly in Venezuela. Simson described it with two further isolates from South African material, and named the species in 1946.[3] Powell, in Australia, has evidently cultured the same organism 17 times from case material obtained in Queensland. Conant[4] has placed the organisms of Simson, O'Daly and Powell into synonymy, but preferred to call the organism *Hormodendrum species* for the time being. It must be mentioned that the usual cause of chromoblasto-

mycosis, *Hormodendrum pedrosoi*, was isolated in South Africa as well by Simson on 3 occasions. It has since been found on 6 further occasions.[5]

Cases of chromoblastomycosis are most uncommon in the Transvaal. Altogether it is probably not seen more than once or twice a year in Pretoria. At the South African Institute for Medical Research, which serves Johannesburg and many outlying areas, the diagnosis of chromoblastomycosis is made on sections 5 times a year on the average.[5] In Simson's original series of 6 cases, 5 came from Natal and the Eastern Province. Two were Indians and one was described as a 'tropical' Native. Friedlander and Moss[6] described a case in a Natal Indian, in which the diagnosis was made microscopically without culture.

In the case reported here, we isolated the Simson species of Hormodendrum from chromoblastomycosis of an upper limb in a European from Thabazimbi, Transvaal.

CASE REPORT

White male aged 51 years. Four years ago, while loading paraffin tins in a dusty rural environment near Thabazimbi, he was bruised by one falling on his left forearm. A slowly-enlarging warty growth began at the spot, healing in places and extending in

Fig. 1. Chromoblastomycosis. Serpiginous warty lesion on back of the hand.

others. It had not responded to penicillin injections. On examination the lower half of the forearm and part of the hand (Fig. 1) were found to be covered with a serpiginous, warty, infiltrative eruption, which had healed with thin scars in places.

The lesions were desiccated with the high frequency current and curetted with a sharp spoon. One year later there was only a thin supple scarring of the treated areas, with no sign whatever of relapse.

Histological examination was made from skin excised at right angles to the serpiginous infiltration. The sections thus extended from the advancing edge to the healing centre of the lesions. The bulk of the lesion at its summit consisted of a warty proliferation or epidermal acanthosis extending in broad solid clubs down the papillary layer of the corium, and embracing in places the upper portions of the sweat ducts and follicular apparatus, for which the acanthotic cells formed thick mantles. There was not much inflammatory invasion or destruction of these hyperplastic epidermal masses. Hyperkeratosis and parakeratosis with some tightly packed masses of transmigrated polymorphs were evident on the surface. There was moderate granular-layer increase in places, and nests of desquamated cells in the centres of some deeper acanthotic extensions. The inflammatory infiltrate affected the entire papillary layer without invading the corium more deeply. At the advancing edge, the infiltration was diffuse, consisting mainly of dilated capillaries with pericapillary lymphocytic infiltration and oedema. Areas of senile elastosis resisted cell invasion. In the diffuse inflammation histiocytes, giant cells, eosinophils and polymorphs were also evident. On the healing side of the sections there was great thickening of the papillary layer, due to small horizontally-placed narrow bundles of a cellular fibrous tissue. Tubercle formation was present throughout the areas affected, and showed a 'watery' tubercle in the invasive areas and a solid type in the older regions, with intermediate forms between. The 'watery' tubercle was a small rounded mass of inflammatory cells with marked central oedema, and an outer layer of compressed cells. The compressed cells were of histiocyte type, which showed dense cytoplasm and formed a layer which was structurally the opposite of a palisade, namely a pseudocapsule. The centre showed an oedematous break-up of the infiltrate, with a number of loose lymphocyte-like cells and with variable neutrophil and eosinophil invasion. The more mature or older type of tubercle appeared to arise by proliferation of this pseudo-capsular layer, forming eventually a solid mass of histiocyte-like cells with dense cytoplasm, gradually filling up the central space in the tubercle. Giant cells seemed to result from coalescence of these cells in the tubercle, and were therefore seen at the margins of the tubercle in certain instances. This appeared to us to represent the pathogenesis of the two types of tubercle, already noted in this condition by Simson.[3] Identifiable organisms were scarce, there being no more than 3 or 4 brown bodies per section. Bodies of uncertain nature, usually smaller than the brown bodies, abounded in the infiltrate.

Isolation and Characteristics of the Organism. Tissue curetted from the lesions was planted on Sabouraud's medium with the addition of actidione. With subculture on solid medium, the colony (Fig. 2) reached 3 cm. in diameter in 6 weeks, producing a low slightly folded grey-black

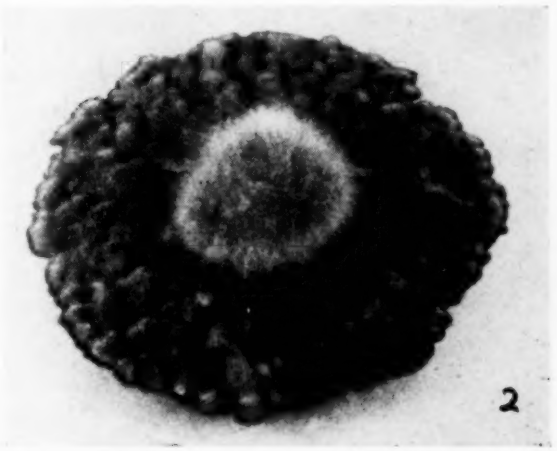

Fig. 2. *Hormodendrum* sp. Actual diameter of colony 3 cm. representing 6 weeks' growth.

Fig. 3. Slide culture of *Hormodendrum* sp., showing long branched-chain conidial masses. *Fig.* 4. High power of conidia in slide culture.

growth with a central tuft of grey aereal hyphae and a fine velvety grey covering over the rest of the colony. The under surface was of non-diffusible tarry black colour. In a semi-fluid Sabouraud agar, the colony formed a grey-black 'puff-ball'. On slide culture, the only type of sporulation seen was of the long branched-chain type, characteristic of Hormodendrum species (Figs. 3 and 4).

SUMMARY

A case of chromoblastomycosis in a European male from the Transvaal is described, in which *Hormodendrum species* was isolated. This organism has apparently not been recovered here since its original isolation by Simson. Some observations on the tubercle formation in chromoblastomycosis are presented.

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CONGENITAL TALIPES EQUINO-VARUS

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There is a high incidence of congenital club-foot both in the European and the Coloured sections of the population of the Western Province. This paper considers some facets of this deformity and its treatment.

AETIOLOGY

The aetiology of club-foot remains an unsolved mystery. Duraiswami[2] of Liverpool injected chick embryos with insulin to produce various congenital deformities, including club feet. This work is a valuable contribution towards the solution of the problem. Denis Browne's ingenious mechanical theory of abnormal intra-uterine pressure has been replaced by an ever-growing weight of evidence from experimental, clinical and histological studies which indicates that the condition is essentially a dysplasia, involving all or most of the tissues below the knee. In a club foot the ossification centre for the navicular invariably appears late and occasionally the foot also has a ray missing. Sometimes

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there is an associated arthrogryphosis. Furthermore, when a resistant club foot is explored at operation, a layer of white tough fibrous tissue, almost cartilaginous in consistency is found in the region of the medial aspect of the talo-navicular joint. It is likely that this abnormal tissue is *propter hoc* and not a *post hoc* phenomenon. These features point to an early developmental error before the limb-bud stage.

Sex Incidence:

The well-known predominance of boys over girls was confirmed in a review recently undertaken by the author at the Royal National Orthopaedic Hospital, London, to investigate the results of tendon transplantation in congenital club-foot. Ninety-four club feet were studied in 61 patients. Of these, 46 were boys and 15 girls (3 : 1). In this series the number of bilateral cases exceeded the unilateral, there being 33 bilateral cases and 20 in the right foot and 8 in the left.

DIAGNOSIS

The recognition of this deformity presents no difficulty. It varies in its severity from a mild form to the gross type, where the big toe lies alongside the lower end of the tibia and the heel is practically non-existent. There are 3, sometimes 4, components of this deformity, viz., (*a*) forefoot adduction, (*b*) inversion of the heel, (*c*) equinus and (*d*) forefoot equinus or plantaris. It has been stated that there is often an associated internal torsion of the tibia (see below). The congenital club-foot has a characteristic tubular calf, in contrast to that associated with spina bifida, where the calf is of relatively normal bulk and shape. The foot is usually smaller than normal.

The patient should be examined for other congenital abnormalities. Where bilateral club-foot occurs in a girl, a radiograph of the hips should be taken to exclude an associated congenital dislocation of the hips and in both sexes the lower spine should be X-rayed to exclude spina bifida occulta. The possibility of anterior poliomyelitis as a cause of the club-foot should always be considered. Paresis or even paralysis may be difficult to detect in the very small foot, but there is usually muscle involvement elsewhere.

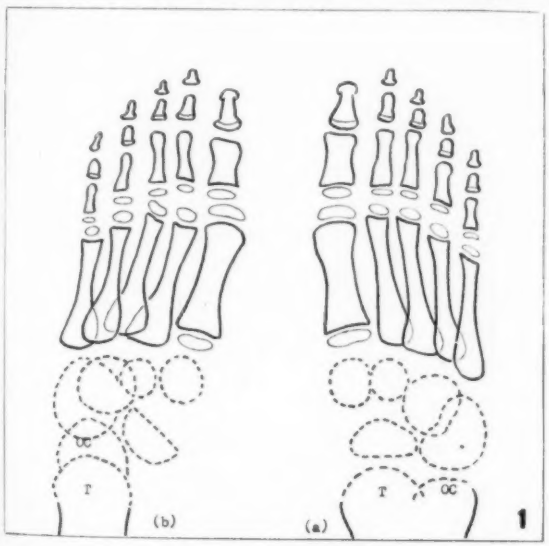

Fig. 1. Line drawing of radiographs of a normal foot and congenital club foot. (*a*) In the normal foot the talo-calcaneal angle between the talus (T) and os calcis (OC) is 35° and the talus, navicular, medial, cuneiform, and first metatarsal are in a straight line. (*b*) The talo-calcaneal angle is obliterated in the club foot and the navicular lies medial to the head of the talus; straight line between talus and first metatarsal is now distorted.

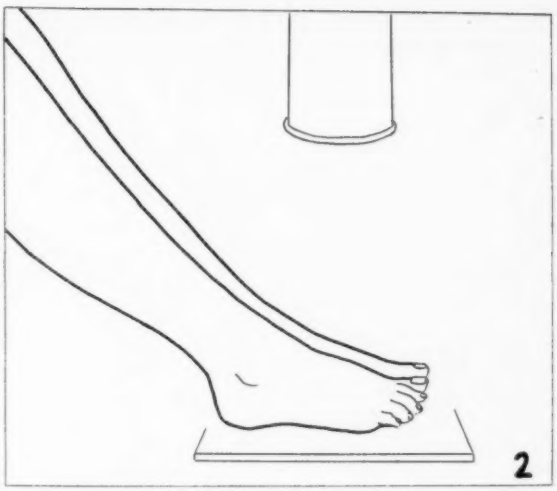

Fig. 2. Standard club-foot position. The radiograph is taken with the child placed on a box and the two feet held together on the casette. The leg-foot angle is obtuse, so that the distal end of the tibia does not overlap the talus. The X-ray tube is lower than normal for diagramatic clarity.

Radiographic Appearances

In the normal foot, in the antero-posterior view, the talus, the navicular and the first metatarsal lie in a straight line (Fig. 1). In club-foot this line is distorted as the navicular lies medial to the head of the talus and the first metatarsal follows suit to a lesser extent. There is normally an angle of 35° (talo-calcaneal angle) between the os calcis and the talus. In the deformed foot the os calcis swings round an horizontal and vertical axis and is situated directly under the talus, so that the talo-calcaneal angle is obliterated. The standard club-foot view is used to show the talo-calcaneal differentiation because with normal antero-posterior views the talo-calcaneal region is hidden by the shadow of the distal end of the tibia. This special view is obtained by placing the child on a box with the two feet held together on the casette. The leg-foot angle is obtuse so that the distal end of the tibia does not overlap the talus (see Fig. 2). Radiographs are used to help assess progress in treatment.

Torsion in Congenital Club-Foot

It has frequently been stated that internal torsion of the tibia commonly occurs in this condition. The tibio-fibular torsion was measured in 45 patients according to the radiographic method described by Rosen and Sandick[5]. In this group of patients there were 63 club feet and the average tibio-fibular torsion was 21° (external); in not one instance was there internal torsion of the tibia. The average tibio-fibular

torsion in the 27 normal feet was 18·1° (external). Rosen and Sandick's figure for normal tibio-fibular torsion is 15° (external). There is thus no excessive internal torsion in club feet; if anything there is a slight tendency towards excessive external torsion. The 'internal torsion' which is said to occur in club feet is probably due to internal rotation of the foot round the talus at the mid-tarsal and sub-talar joints. This is the result of the patient's trying to obtain a more stable base to walk on.

TREATMENT

The aim of treatment is a painless, supple, plantigrade foot of normal contour which can fit into ordinary shop-shoes.

A. As soon as the baby has regained its birth-weight, at about 10-14 days, treatment should be started. The method employed depends on individual preference. Either the Denis Browne hobble splint or felt and strapping used efficiently and continuously will result in a considerable proportion of feet being well corrected with excellent end-results.

B. What of the patients from the age of 6 months upwards in whom correction has not been complete or in whom relapse has occurred or who have never had any treatment?

1. *Splints, irons, springs and alterations to boots*

These are quite ineffective and can neither correct a deformity nor prevent further relapse.

2. *Forcible manipulation under general anaesthetic*

A considerable degree of apparent correction can be obtained by this means in many cases, but after several manipulations the recurrence-rate is high and the procedure has to be repeated. When force is used the position of the scaphoid on the medial side of the head of the talus frequently remains unchanged and a spurious correction occurs at the cuneo-navicular and the cuneo-metatarsal joints because of stretching of the ligaments at these joints. Furthermore, if the foot is forcibly dorsiflexed, the scaphoid is forced upwards on the inner side of the head of the talus. It is thus easy to visualize why relapse is common. Subsequent radiographic appearances and operative findings, with deformed bones and arthritic joints, condemn this line of treatment. Forcible manipulation traumatizes the soft tissues; the response of the body to tissue damage is fibrosis and a progressively rigid foot develops. Thus a vicious circle is established and more violence is required to overcome the rigidity.

Who can forget the frightened, anguished look in the eyes of the children coming up weekly or fortnightly for their 'M and P under G.A.'?

3. *Operations*

(*a*) Bony operations under the age of 12 years are unsatisfactory. Often the deformity recurs and the foot remains small and stiff.

(*b*) Soft-tissue correction similar to that described by Brockman[1] is sometimes required as an adjunct to the Kite treatment (see below).

(*c*) Elongation of the tendo Achillis (ETA) and posterior capsulotomy is an operation frequently performed to overcome equinus. In a series at the Royal National Orhthopaedic Hospital this operation was performed on 30 feet, and in only 2 instances out of 15 (in the others there was no record) could the foot be brought up to more than a right-angle at the end of the operation. This finding is in accord with Kite's view who found that ETA and posterior capsulotomy permitted only limited correction. This is not surprising, because in cases where the deformity has been present for some time the so-called flat-topped talus develops. Any correction obtained at operation is therefore more apparent than real and is due to opening of the joint posteriorly. When weight-bearing is resumed after the plaster is removed the joint shuts posteriorly, as is evidenced by the number of relapses after this operative procedure. In the author's opinion there is a limited place for ETA . Where there is a small heel tucked away against the side of the foot it is frequently difficult to correct. The tendo Achillis is one of the deforming factors holding the heel inverted. With ETA the heel drops down and one can proceed with further correction by wedging (see below).

Kite's Method

In 1929 Kite,[3] an American surgeon, described a method of treating the difficult, relapsed or incompletely corrected club foot. Although the idea was not original, he was responsible for re-emphasizing the basic principles and for developing the technique. The method was practically untried in the UK until 1949, when a group of American orthopaedic surgeons on a visit drew attention to this fact. A special clinic was established at the Royal National Orthopaedic Hospital and the method was given a thorough trial. Our experience of Kite's technique and the details have already been described.[3] The method is now used at other centres in Great Britain. With the experience gained I am convinced that this method is the best for the correction of deformity between the ages of 6 months and 8 years.

There are 4 components of the deformity (see above), viz. (1) forefoot adduction, (2) inversion of the heel, (3) equinus, and (4) plantaris (forefoot equinus). The principle of the Kite method is that each component is corrected separately and in the above order by serial wedged plasters. This is done at weekly intervals until full correction has been secured. This method requires no anaesthetic and inflicts no pain on the child and no trauma on the foot. Correction is methodical and the child lives a healthy, active life during treatment, and schooling is not interrupted. In the majority of patients this method succeeds in correcting the deformity. After correction has been achieved, Kite uses a retention plaster for 6 months to maintain it.

As an alternative, 76 transplantations were performed at the Royal National Orthopaedic Hospital, transferring the tibialis anterior to the outer side of the foot. This operation was based on the premise that the tibialis anterior is the most powerful deforming factor causing relapse. The results of this operation are discussed elsewhere.[6]

SUMMARY

1. The aetiology and diagnosis of congenital club foot is discussed.

2. The radiographic appearances, including the talo-calcaneal angle, are described.

3. Tibio-fibular torsion was measured in 63 club feet. In no instance was there excessive internal torsion. This is contrary to what has previously been described.

4. The principles of the Kite method of treatment are outlined, and various other forms of treatment are discussed.

In conclusion it may be said that the treatment of this deformity demands great patience, meticulous attention to detail, and judgment of high order.

I wish to acknowledge with much pleasure my indebtedness to my former chief A. T. Fripp, Esq., F.R.C.S., Royal National Orthopaedic Hospital, who was responsible for initiating and encouraging my interest in the treatment of the difficult club foot.

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SOUTH AFRICAN ORTHOPAEDIC ASSOCIATION

A clinical meeting of the South African Orthopaedic Association was held at Boksburg Hospital, on 22 March 1957. The chair was taken by Mr. C. T. Moller and 15 members were present. The following statement is supplied by the Hon. Secretary, Mr. Sidney Sacks:

MALIGNANT DISEASE OF BONE

Mr. A. D. Polonsky spoke on his experiences of malignant bone conditions. He had recently been overseas, when he was associated with Prof. B. W. Windeyer of the Mount Vernon Hospital, London and with Sir Stanford Cade of the Westminster Hospital. He prefaced his remarks by stating that the South African Orthopaedic Association should be represented on the South African National Cancer Campaign.

He described the work being done with super-voltage therapy for bone cancer and the programme adopted in a case of bone cancer. The patient is thoroughly investigated by a proper skeletal survey to define all primary and secondary malignancies. Full blood studies are carried out.

The cancer site is then given one dose of deep X-ray therapy, with a check on the skin reaction and blood reaction to this primary dose. This primary dose of supervoltage therapy helps to localize the tumour. A biopsy is then performed on the tumour by a special technique, which he described as follows:

A tourniquet is not employed, because the surgeon wishes to inspect the tumour *in vivo* with its blood supply intact. Also any tumour cells that are spilled during the biopsy are washed out of the wound with the haemorrhage. Each layer of skin, fascia, muscle and periosteum is incised separately and the bleeding points meticulously picked up and cauterized. A small trocar and cannula, called an Anthony-Green punch, is then inserted into the tumour and a minute portion of the growth the size of a match-head is removed from the periphery and then from the centre of the cancer. It is sent away for thorough study by the pathologist and not merely examined by immediate frozen section. The track of the punch is then seared with the cautery and the wound neatly closed in layers. On the second day after this biopsy the cobalt-bomb or supervoltage therapy is commenced.

By this method the risk of spreading the tumour into the general lymphatic or vascular circulation is reduced to a minimum.

Some sarcomas of bone are still alive after 15 years, particularly reticulum-cell tumours and lymphosarcomata, which appear to respond more successfully to deep therapy. Mr. Polonsky mentioned two of his own cases who had survived 2 years without amputation, and one case who died with a fungating mass in the thigh 5 months after the onset of a sarcoma in the lower end of the femur.

This led to a discussion on how soon amputation should be advised after deep X-ray therapy. Mr. G. T. du Toit mentioned a case who was still alive 7 years after an amputation for a sarcoma of the leg. Mr. Polonsky was of the opinion that early-amputation cases very seldom survive more than 1 year.

Mr. B. Polonsky showed the following cases:

(*a*) A boy aged 15 years who had been shown at a meeting 12 months previously with Koenig's disease (osteochondritis dissecans) of the hip joint. He had been put on skin traction to the leg for 9 months and a weight-relieving caliper for 3 months. The X-rays now show that the osteochondritic area has healed.

(*b*) A nursing sister who had cut her flexor pollicis longus tendon with a glass, and only reported for treatment 3 months later. At operation the proximal end of the tendon was found coiled up like a spring in the forearm 3 inches proximal to the wrist. He had done a free graft, using the palmaris longus by attaching it to the musculo-tendinous junction of the flexor pollicis longus and inserting its end into the base of the distal phlanx with a pull-out wire suture. A very good functional result was obtained.

VISITS TO AMERICA

Mr. J. D. Retief related his experiences during a recent stay in America, and his observations at the various orthopaedic centres which he visited. He illustrated his talk with slides. The following points were of interest:

(*a*) Slides showing the plaster-cast wedging technique employed in the Kite method of treating clubfeet.

(*b*) Slides of a calcaneus foot plate and inverted Y sidebars used in preventing or holding calcaneus deformities of the feet.

(*c*) X-rays of the double-onlay-graft method now exclusively used in America for congenital pseudo-arthrosis of the tibia.

(*d*) The 4 types of pertrochanteric fractures of the femoral neck and the Neufeld pin plate used in their treatment.

(*e*) He mentioned that abduction subtrochanteric osteotomy was being used for Perthe's disease—to bring an unaffected area of articular surface of the femoral head to bear weight in the acetabulum.

(*f*) The Grice extra-articular bone graft for valgus and spastic feet is quite popular in America. Iliac or rib grafts are employed.

(*g*) Abdominal fascial transplants to stabilize the thoracic cage on the pelvis in polio are performed in severe cases. This procedure increases the vital capacity of the chest and allows the diaphragm to act more effectively on the stabilized ribs and thoracic cage.

(*h*) Interscapular fascial slings are used to stabilize weak shoulders in polio. A weak deltoid can thus be made to function more effectively because the scapula on the weak side is stabilized against the unaffected shoulder of the opposite side.

(*i*) External oblique abdominal muscle transplants are used to reinforce the weak abductor muscles of the hip. They enable the patient to lift the leg and establish a more useful gait.

(*j*) Prosthetic research in Los Angeles has attained a high level of efficiency. They have discovered that sebaceous cysts and bursae in amputation stumps are due to torsional strains of the prosthesis on the stump skin. To overcome this torsional strain the prosthetic ankle joint is made to allow some rotation at this joint and thus prevent the twisting strain of the upper part of the prosthesis on the amputation stump.

(*k*) There is a tendency in America to revert to end-bearing amputation stumps—in above-knee and through-knee amputations. End bearing is supposed to prevent osteoporosis of the bone in the stump and therefore alleviates pain in the stump.

Mr. D. Roux also described his observations made during his stay in America:

(*a*) He was impressed by the comprehensive training programme for orthopaedic surgeons at the Hospital for Special Surgery in New York. There are 12 doctors always in training as

orthopaedic surgeons and they rotate through three different hospitals for a period of 3 years.

(*b*) In the treatment of Pott's disease of the spine, the area of fusion is not merely confined to the vertebra above and below the affected vertebrae, but includes all the vertebrae in the vicinity of the Pott's abscess.

(*c*) He saw cases experimentally fed on excessive doses of vitamin A, which produced the most bizarre disturbances of epiphyseal growth.

(*d*) Avascular necrosis of the femoral head in patients aged 20-30 years appeared to be commoner in America. Many of these were dancers on the stage or ballet dancers.

(*e*) Tendon transplants for calcaneus feet in which the anterior or lateral muscles were placed into the calcaneus or into the tendo Achillis were done frequently—not to provide a better push-off gait but to prevent progression of gross calcaneus deformity.

(*f*) Meniscus injuries of the knees were less common in America than in South Africa. This was probably due to the fact that young men retire from more vigorous sport at an earlier age in America than in South Africa.

(*g*) In triple arthrodesis operations on feet, the foot is aligned with the ankle and not with the knee—because there is usually some associated tibial torsion.

(*h*) Varus deformities arising in flail feet of polio cases can be prevented by putting 15° to 20° of external rotation on the caliper.

The Chairman thanked the speakers for their interesting presentations, and the staff of the Boksburg Hospital for their hospitality.

COST OF KEEPING PATIENTS IN MENTAL HOSPITALS

By Our Parliamentary Correspondent

One of the most important provisions of the Mental Disorders Amendment Bill, which was passed in all its stages in the Assembly, is that the cost of keeping patients in mental hospitals will in future be borne by the State.

In introducing the Bill the Minister of Health (Mr. J. H. Viljoen) said that under Section 79 (2) of the Mental Disorders Act the cost of keeping a patient in a mental hospital could be recovered from his estate, or from persons legally obliged to contribute towards the maintenance of the patient. This included parents, grandparents, children, brothers and sisters and, in the case of a married woman, her husband.

'If it is borne in mind that mental patients are often kept in institutions for an indefinite period, sometimes even for life, the financial tribulations caused to the relatives who must contribute towards the maintenance of such patients can be imagined,' said the Minister. 'In the case of lepers, the cost of keeping them in institutions is borne by the State and it has been decided to apply the same principle in the case of mental patients.'

There were certain exceptions, however. These applied to patients living outside the Union and admitted to an institution in the Union; patients not resident in the Union and admitted to an institution here within 2 months of their arrival; and voluntary patients. The procedure in regard to the payment of maintenance costs of patients falling within these categories, remained unchanged. While the payment of these costs was compulsory, the case of a voluntary patient would be treated on its merits.

As regards the financial implications of keeping patients in mental hospitals at the expense of the State, the Minister said that the expenditure in respect of the maintenance and administration of Departmental institutions for mental patients and mental defectives, came to £2,921,404 during the financial year ended 31 March 1956, while maintenance contributions collected from relatives amounted to only £132,122. If the Bill were accepted, the State would lose approximately £132,000 a year, but this amount would be recovered to a certain extent by a decrease in administration costs.

In supporting the Bill on behalf of the Opposition, Dr. Zac. de Beer (Maitland) said the Minister had moved in what they considered to be the right direction by going as far as he could with the free hospitalization principle. He expressed the hope that in future it would be possible to extend this principle to voluntary mental patients and alcoholics as well.

'They are classes of patients who deserve the closest consideration of all those interested in mental work,' said Dr. de Beer. 'If there is one development that has taken place in our mental hospitals in recent years which should be welcomed by everyone interested in this subject, it is the development of the voluntary patient—the patient who, sensing that he is becoming ill, is prepared to come for mental treatment in the same way that patients come for treatment for other conditions.'

THE ALCOHOLIC

Dr. de Beer said that in essence an alcoholic was also a voluntary patient who submitted himself for treatment in order to be cured. Alcoholism was assuming great proportions and could become a very real danger to the social fabric of the country.

Mrs. Bertha Solomon (Jeppe) said there were a great many cases of alcoholics who were in and out of jail simply because there was nowhere to send them. Even if they wanted to submit to voluntary treatment, there were not sufficient institutions to accommodate them. She reminded the Minister of the remarks made a year or two ago by a Johannesburg magistrate in respect of the appalling number of women who were in and out of jail for drunkenness simply because there was no institution to which they could be compelled to go.

'In a multi-racial country like ours, it is particularly distasteful to see drunken women in parks and in the streets of our big cities, while there are no means of either compelling them to go somewhere or, even if they could be compelled, of paying for them while they are in those institutions,' said Mrs. Solomon.

Dr. Carel de Wet (Vereeniging District) said the House must be careful not to create the impression that no provision was made for alcoholics and voluntary patients as regards costs. It was impossible, however, to place all the responsibility on the State through legislation. Sweden had accepted this responsibility through legislation, with the result that many people, mostly well-to-do, who had become psychopaths, felt that they needed treatment while there was nothing wrong with them. It would place the State in a very difficult position if it should oblige itself to treat such people free of charge. Dr. de Wet said it should be reassuring to the public to know that the term 'alcoholic' also included those people who were addicted to drugs.

THE MINISTER'S REPLY

Replying to the debate the Minister of Health said that recently he had had discussions with the Ministers of Social Welfare and Labour, and the three departments were now going into the question to ascertain to what extent direct provision could be made for alcoholics.

'It is our intention to make provision in the Loan Estimates for a scheme which would provide a large number of beds to accommodate these people,' said the Minister. 'As regards the ordinary mental patient, we admit there is a great shortage of accommodation at our institutions. But we are now busy planning extensions on a fairly large scale. Among others, the intention is to establish a large institution for non-Europeans at Pietersburg, while extra accommodation will be provided at the Valkenburg Hospital. This matter has been fully investigated and the Department of Health, together with the Department of Public Works, is hard at work to provide as much of the required accommodation as possible with the least possible delay.'

DUTCH MEDICINES: NEW REGULATION GAZETTED

The Minister of Health, in the Exercise of the powers conferred upon him by Sections 42 and 43 of the Food Drugs and Disinfectants Act No. 13 of 1929, and after due compliance with the requirements of sub-section (3) of Section 42 of the said Act, has amended with effect from the date of publication of the notice in the Government Gazette (10 May 1957) the regulations made under Section 42 of the above Act and published under Government Notice No. 575 of 28 March 1930, by the addition of the following new regulation:

'31 *bis. Dutch Medicines.*—The standard in respect of the Dutch Medicines listed hereunder shall be as laid down in the current edition of the British Pharmacopoeia, or British Pharmaceutical Codex published by the Pharmaceutical Society of Great Britain or in any supplement thereto:

LIST OF DUTCH MEDICINE FORMULAE.

List A.—The undermentioned shall be the formulae for the Dutch Medicines mentioned:

Dutch Medicine.	*British Pharmacopoeia or British Pharmaceutical Codex Equivalent.*
Bloedstillende druppels	Tinctura Ferri Perchloridi B.P.C. 1949.
Boegoe-essens	Tinctura Buchu B.P.C. 1949.
Diapalmpleister	Emplastrum Plumbi in Massa B.P.C. 1949.
Doepa	Benzoin B.P. 1953.
Doepaolie	Balsamum Peruvianum B.P. 1948.
Duiwelsdrek	Asafoetida B.P.C. 1949.
Duiwelsdrekdruppels	Tinctura Asafoetidae B.P.C. 1949.
Grouvomitief	Prepared Ipecacuanha B.P. 1953. Standardization of dose 10 grains.
Gal-en-slymmengsel	Mistura Sennae Composita B.P. 1948.
Hartshoringoplossing	Dilute Solution of Ammonia B.P. 1953.
Hoffmannsdruppels	Spiritus Aetheris.
Kamille	Anthemis B.P.C. 1949.
Kamille-essens	A 1 in 10 Tincture prepared from Anthemis B.P.C. using 45 per cent Alcohol.
Kinderpoeier	Compound Powder of Rhubarb B.P. 1953.
Miangolie	Balsamum Peruvianum B.P.C. 1949.
Mierolie	Carbonei Disulphidum B.P.C. 1934.
Pampoensalf	Unguentum Hydrargyri Oxidi Flav. B.P.C. 1934.
Patatsalf	Unguentum Hydrargyri Oxidi Rubri B.P.C. 1949.
Pepermentdruppels	Spirit of Peppermint B.P. 1953.
Rooidefensiefpleister	Emplastrum Ferri B.P.C. 1934.
Rooilavental	Tinctura Lavendulae Composita B.P.C. 1949.
Ruitersalf	Dilute Ointment of Mercury B.P. 1953.
Rooiminie	Lead Monoxide B.P. 1953.
Sinkingsdruppels	Vinum Colchici B.P.C. 1934.
Staaldruppels	Solution of Ferric Chloride B.P. 1953.
Staalpille	Pilula Ferri Carbonatis B.P. 1948.
Sterksalf	Unguentum Methyl Salicylatis Fort.
Suurdruppels	Acidum Sulphuricum Dilutum B.P.C. 1949.
Suurpoeier	Compound Powder of Rhubarb B.P. 1953.
Turlington	Compound Tincture of Benzoin B.P. 1953.
Verdwynpleister	Emplastrum Plumbi in Massa B.P.C. 1949.
Vliertee	Sambucus B.P.C. 1949.
Witdefensiefpleister	Emplastrum Plumbi in Massa B.P.C. 1949.
Witdulsies	Spiritus Aetheris Nitrosi B.P.

List B.—Dutch Medicines (the names of which are Afrikaans or Hollands translations of official descriptions or synonyms of substances):

Anysolie	Anise Oil B.P. 1953.
Antimoonwyn	Vinum Antimoniale B.P.C. 1934.
Arnikatinktuur	Tincture Arnicae Floris B.P.C. 1949.
Balsem-kopiva	Copaiba B.P.C. 1949.
Basilikonsalf	Unguentum Colophonii B.P.C. 1949.
Bergamotolie	Oleum Bergamottae B.P.C. 1949.
Boegoeblare	Buchu B.P.C. 1949.
Gemmer Essens	Strong Tincture of Ginger B.P. 1953.
Harpuissalf	Umguentum Colophonii B.P.C. 1949.
Jalappoeier	Jalapa Praeparata B.P.C. 1949.
Kajapoetolie	Oleum Cajaputi B.P.C. 1949.
Kanfer	Camphor B.P. 1953.
Kaneelolie	Cinnamon Oil B.P. 1953.
Kanferolie	Liniment of Camphor B.P. 1953.
Karbololie	Oleum Phenolatum B.P.C. 1949.
Krotonolie	Oleum Crotonis B.P.C. 1949.
Naeltjieolie	Clove Oil B.P. 1953.
Opodeldoc	Liniment of Soap B.P. 1953.
Paregorie, Paragoriese elikser	Camphorated Tincture of Opium B.P. 1953.
Pepermentessens	Spirit of Peppermint B.P. 1953.
Pepermentolie	Peppermint Oil B.P. 1953.
Rabarberpoeier	Powdered Rhubarb B.P. 1953.
Teerolie	Creosote B.P. 1953.
Witkinapoeier	Quinine Sulphate B.P. 1953.'

ASSOCIATION NEWS : VERENIGINGSNUUS

TAK WES-KAAPLAND, VOORGESTELDE AFDELING IN NOORDWES-KAAPLAND

Gedurende die naweek van 4/5 Mei het 'n klein afvaardiging van lede Calvinia besoek om die moontlikheid, om 'n nuwe Afdeling van die Tak in hierdie gebied te stig, te ondersoek.

Dr. D. J. Slabber van Calvinia het as plaaslike sameroeper opgetree om praktisyns in hierdie gebied uit te nooi om 'n vergadering vir hierdie doel by te woon. Dr. P. J. M. Retief het die reëlings vanaf Kaapstad georganiseer en drs. E. B. Malherbe, M. J. Bailey en J. D. Sim het hom as genooide sprekers vergesel.

Drs. D. J. Slabber, R. T. Truter, J. S. Pretorius en J. H. E. Lombard van Calvinia, dr. J. Dommisse van Williston, dr. F. J. van Niekerk van Citrusdal, en drs. J. H. J. Roux en Anna Louw van Vredendal was by die vergadering teenwoordig. Apologie is van drs. C. G. Coetzee, J. P. Scheltema en R. Oosthuizen van

Sutherland, en drs. C. A. en E. Retief van Lambertsbaai ontvang, wat weens ondeurganklike paaie nie aanwesig kon wees nie. Die volgende tandartse het ook die vergadering op uitnodiging bygewoon, naamlik dr. J. C. Dreyer van Vredendal en drs. I. L. Carstens en J. D. de Wet van Calvinia.

Gedurende die agtermiddag is 'n kliniese vergadering gehou en dr. M. J. Bailey het gepraat oor *die Beheer van Suikersiekte*, dr. Malherbe oor *die Diagnose en Behandeling van Akute Buiknoodgevalle*, en dr. Sim oor *Aneurismas van die Buikslagaar*. Die lewendige wyse waarop die lede van die byeenkoms vrae gestel het, was 'n bewys van die waardering van die onderwerpe.

Na verversings en 'n baie aangename aandete by 'n plaaslike hotel, is 'n bespreking gehou om die moontlikheid van die stigting van 'n Afdeling van die Tak in Noordwes-Kaapland te ondersoek. Dr. Retief het verskoning aangeteken vir dr. J. S. du Toit, President van die Mediese Vereniging van Suid-Afrika, wat weens ongesteldheid nie die vergadering kon bywoon nie. 'n Brief van dr. du Toit is voorgelees waarin hy sy persoonlike ondersteuning beloof en waarin hy sy verwagting uitspreek dat die plan om 'n nuwe Afdeling te vorm, vrugte sal afwerp.

Dit was baie duidelik dat daar baie entoesiasme vir die stigting van so 'n Afdeling was, en die praktisyns teenwoordig was eenparig van mening dat die Afdeling beide die gebied langs die Olifantsrivier en die gebied bokant die berg behoort in te sluit, en dat die mediese bevolking van Calvinia, Brandvlei, Williston, Loeriesfontein, Sutherland, Vanrhynsdorp, Vredendal, Lambertsbaai, Klawer, Clanwilliam en Citrusdal dus hierdeur ingesluit sou word. Die aanwesiges het gevoel dat as daar gepoog word om hierdie gebied in twee Afdelings op te deel, die Afdelings op sigself te klein sou wees, en verskeie geneeshere het beklemtoon dat hulle gewoond is om lang afstande af te lê, en dat dit hulle geensins sal verhoed om vergaderings by te woon nie, al word die vergaderings op Calvinia of enige van die dorpe langs die Olifantsrivier gehou.

Die vergadering het besluit dat 'n inwydingsvergadering van hierdie voorgestelde Afdeling vir die nabye toekoms gereël sou word, wanneer die Konstitusie formeel vasgestel, en die eerste ampsdraers gekies sal word.

Dr. D. J. Slabber het goedgunstiglik onderneem om as Sameroeper vir die volgende vergadering op te tree.

Die vergadering het eenparig besluit dat die Afdeling die ‚Afdeling Noordweste' genoem behoort te word.

PASSING EVENTS : IN DIE VERBYGAAN

Union of South Africa. Department of Health. Notification of formidable epidemic diseases and poliomyelitis in the Union during the period 10 May to 16 May 1957.

Poliomyelitis

	Eur.	*Nat.*	*Col.*	*Asiat.*	*Total*
Transvaal	11	4	1	—	16
Cape Province ..	6	4	9	—	19
Orange Free State ..	—	—	—	—	—
Natal	8	2	—	—	10
Totals	25	10	10	—	45

Plague, Smallpox, Typhus Fever: Nil.

Aangifte gedurende die tydperk 17 Mei-21 Mei 1957:

Poliomiëlitis

	Bl.	*Nat.*	*Kl.*	*As.*	*Totaal*
Transvaal	1	1	—	—	2
Kaapprovinsie ..	6	3	4	—	13
Oranje-Vrystaat ..	5	2	—	—	7
Natal	2	3	1	—	6
Totaal ..	14	9	5	—	28

Pes, Pokkies, Tifuskoors: Geen.

* * *

Tak Wes-Kaapland: 'n Dans sal op Saterdag 15 Junie 1957 by die King David Country-Klub (naby die D. F. Malan Lughawe) gehou word. Kaartjies is verkrygbaar by die Takkantoor, Waalstraat 35, Kaapstad (Telefoon 3-1574).

* * *

Members are reminded that they should notify any change of address to the Secretary of the Medical Association of South Africa at P.O. Box 643, Cape Town, as well as to the Registrar of the South African Medical and Dental Council, P.O. Box 205, Pretoria.

Failure to advise the Association can only result in non-delivery of the *Journal*. This applies to members proceeding overseas as well as to those who change their addresses within the Union.

* * *

Dr. Geoffrey Dean has proceeded overseas to visit Holland, Sweden, England and the United States in order to study porphyria in those countries. He will be working with Prof. Jan Waldenström in Sweden, Prof. Rimington in London and Prof. Cecil Watson in Minneapolis. The main purpose of this research tour is to ascertain if porphyria in those countries is the same genetic disorder as occurs in South Africa. The research is assisted by a senior bursary from the Council for Scientific and Industrial Research.

* * *

The Southern African Cardiac Society. The following meetings have been held this year in Cape Town, with Dr. Maurice Nellen, Chairman, and Dr. Louis Vogelpoel, Secretary.

1. 17 *January* 1957. Dr. M. M. Suzmann gave an address on The Value of Long-term Anti-coagulant Therapy in Coronary Heart Disease.

2. 2 *April* 1957. The programme was as follows:

(*a*) *An unusual case—? Ebstein's malformation, ? idiopathic dilatation of the right auricle. By Dr. A. Swanepoel.*

(*b*) *Ventricular septal defect associated with aortic incompetence. Report of a case with necropsy proof. By Dr. Maurice Nellen.*

(*c*) *Dietary fat in coronary heart disease. Original data presented on the long-term effects of feeding unsaturated fats on the blood cholesterol. By Dr. H. Gordon.*

(*d*) The Chairman announced that arrangements had been made for the National meeting to take place in Durban, on September 20 1957. Dr. David Edington, Secretary, Natal Section, has arranged for a suitable venue.

(*e*) Dr. Louis N. Katz, of Chicago, Secretary of the International Society of Cardiology, has asked for a list of all the members of the Southern African Cardiac Society, and also for a contribution of 30 cents to the International Cardiac Society from each member. Dr. V. Schrire, Treasurer, Cape Province Section, was instructed to collect the money and forward a draft to Dr. L. Katz.

* * *

Dr. H. A. Shapiro, of Johannesburg, has been invited to be a Vice-President of the First International Congress on Forensic Pathology, which is to be held in Brussels in July this year. He has also been asked to act as Chairman at one of the sessions of the Brussels meeting. Dr. Shapiro will be leaving for overseas in the near future to attend this meeting as well as to pay a visit to the United Kingdom. He expects to be back in South Africa early in August.

* * *

Essay Contest. The American Dermatological Association is offering awards for the best essays submitted for original unpublished work relative to some fundamental aspect of dermatology or syphilology. The awards amount to $500, 400, 300 and 200 for the first 4 places. Manuscripts, typed in English with double spacing and ample margins, together with illustrations, charts and tables, all in quintuplicate, are to be submitted not later than 15 November 1957. Manuscripts are to be sent to Dr. J. Lamar Callaway, Secretary, American Dermatological Association, Duke Hospital, Durham, North Carolina, and should not

exceed 10,000 words. Papers must be submitted under a nom-de-plume without any indication of the institution where the work was done; and also the nom-de-plume and the full name and address of the author in a separate plain envelope. The competition is open to scientists generally, not only to medical practitioners. Essays will be judged on the following considerations: (1) Originality of ideas, (2) potential importance of the work, (3) experimental methods and use of controls, (4) evaluation of results, (5) clarity of presentation. The results will be announced before 1 January 1958, and winning papers become the property of the Association. The candidate winning the first award may be invited to present his paper at the annual meeting of the Association, with expenses paid in addition to the award.

* * *

Dr. Michael Gelfand will speak on 'Some Considerations of the Effects of Parasitic Disease in the Tropics' at 8.15 p.m. on Tuesday, 4 June, in the Physiology Lecture Theatre, Medical School, Mowbray. All members of the Association are cordially invited to attend.

CORRESPONDENCE : BRIEWERUBRIEK

AN INADEQUATE SALARY

To the Editor: The City of Johannesburg has been advertising a part-time post at £706 per annum inclusive, 27 hours per week, 8.30 a.m. to 1 p.m. Monday to Saturday.

I am informed by the City M.O.H. that the post is in Alexandra township and that applicants have to provide their own transport.

Allowing 20 miles for the return trip to Alexandra at 1s. per mile one should deduct £260 from the above annual salary.

Not counting the time for the trips the net salary amounts to approximately 6s. 4d. per hour—less than the usual pay for a good typist!

I hope no general practitioner is so hard up or so careless as to respond to this offer by the Golden City!

G.P.

TRACE ELEMENTS AND 'TOXAEMIA' OF PREGNANCY

To the Editor: I wish to convey my sincere thanks to all those superintendents of hospitals and private practitioners who kindly responded to my several appeals in your valued journal on the subject of the incidence of so-called toxaemia of pregnancy in South Africa.

I read a paper at the congress of the South African Society of Obstetricians and Gynaecologists recently held at Cape Town in which I submitted certain facts which I now briefly summarize as follows:

The incidence of so-called toxaemia of pregnancy varies with race and place. There is a high incidence in the Cape Western and Peninsula areas which corresponds with the map published by Dr. K. Schütte, of the University of Cape Town to show the distribution of trace-element deficiencies in the soil. In the South Eastern coastal area the same high incidence of toxaemia and of trace-element deficiency is found.

In the Transkei and Basutoland and other inland areas the incidence of toxaemia is low. In the heavily populated urban areas, such as Johannesburg, it is significantly higher, especially amongst the urbanized Bantu. In the Cape Peninsula Bantu women living on a low dietary scale in detribalized conditions show a high incidence and their diastolic blood pressures during all stages of pregnancy are lower than those of urbanized Bantu living under tribal conditions and on a better diet.

The caloric value of the diets is not an important factor. In the Windermere area in Cape Town the diet of the de-tribalized Bantu is of higher caloric value than that of the tribalized urban Bantu living in the Langa settlement. The old argument of low caloric diet in Holland during the famine years of the last war and decreased incidence of toxaemia at that time is therefore probably of no significance.

The livers of at least 2 women who died of eclampsia showed a two-thirds loss of their copper content. The copper content of the placenta of an eclamptic woman was also significantly lower than that of a normal placenta. A 3 months' observation of pregnant women at two Cape Town ante-natal clinics on a daily dose of trace elements and vitamin pills showed a significant rise in the low diastolic blood pressure and the patients lost their lassitude and felt very much better in themselves.

A small number of toxaemic women in hospital on trace-element therapy showed (1) Loss in weight and disappearing oedema, (2) Drop in elevated blood pressure, (3) Disappearance of albumen or significant decrease, (4) Normal, non-induced labours, and (5) Marked diuresis.

A case of triplets and a case of twins with gross hydramnios did especially well. N.B. Cases with definite renal and so-called essential hypertension did not respond so well.

Trace elements are now receiving a great deal of attention in America. England and the Continent have not reacted at all so far.

Prof. James T. Louw of the University of Cape Town, who has always given me much help and encouragement, has intimated that he will set up a small committee of specialists to carry out research on this subject. I am most grateful to him. To Prof. I. S. Perold and his hard working staff at Stellenbosch-Elsenburg Agricultural College I owe a debt of gratitude for estimating the trace element content of many specimens for me. In my opinion the world will be greatly indebted to them in the course of time for pioneer work on element-deficiency diseases in animals, and now in man.

To Dr. Attati, foreign research medical officer of Messrs. Lederle of America and to Messrs. B. Owen Jones of Johannesburg I am truly grateful for the free supply of a great deal of therapeutic materials.

My interest in trace elements dates from observations made in 1953 on my farm 'La Provence' Fransch Hoek, Cape.

D. P. de Villiers

Groote Kerk Buildings
Adderley Street
Cape Town
10 May 1957

WORKMEN'S COMPENSATION ACT—MEDICAL ACCOUNTS

To the Editor: A representative of Federal Council of the Medical Association of South Africa has been appointed as Liaison Officer to the Workmen's Compensation Act Commissioner to assist him with problems arising out of the administration of the Act in so far as the medical treatment of injured workmen is concerned.

The W.C.A. Sub-committee of Federal Council has also made arrangements with the W.C.A. Commissioner whereby the latter can call on specialists in Pretoria and Johannesburg for advice. There is therefore a close liaison with the Commissioner.

The satisfactory administration of the Act can only be carried out with the assistance and cooperation of all medical practitioners and this liaison has been established for the purpose of discussing problem cases and assessing accounts.

It has been found, for instance, that certain practitioners over-visit cases of a minor nature. In some cases numerous visits are recorded and claimed for when two or three would have been sufficient. Some practitioners diagnose deep-seated sepsis, e.g. tendon-sheath infection within 24 hours of injury, whereas it is generally accepted that in the vast majority of cases recognizable sepsis only supervenes after about three or four days.

Some practitioners are inclined to prescribe drugs and dressings to an excessive extent and, while it is not the intention of the Commissioner to curtail necessary prescription of drugs and

dressings, it will be appreciated if practitioners will bear in mind that unnecessary prescribing is a severe drain on the accident fund. When a prescription is handed to a patient for drugs and dressings they are for use by the patient at home only and may not be used by the practitioner in his consulting room.

A good relationship exists between the Medical Association and the W.C.A. Commissioner and nothing must happen on the part of members of the Association to disturb that harmony.

L. O. Vercueil
Convener, W.C.A. Sub-committee
P.O. Box 20
Maraisburg
12 May 1957

SARCOIDOSIS: CALCIUM AND THE KIDNEYS

To the Editor: I have read with a great deal of interest, your Editorial[1] on this subject, which appeared in the *Journal* of 11 May 1957.

In it you state that in patients who present with the complication of disordered calcium metabolism the most important differential diagnosis is from hyperparathyroidism, and that this latter condition may closely mimic sarcoidosis. I should like to make one or two further comments on the differential diagnosis.

Bone lesions, when present, are of course different in the two conditions. In sarcoid these are in the nature of circumscribed lesions of coarse trabeculation and sharply punched-out small cyst-like areas, chiefly in the hands and feet; whereas in hyperparathyroidism one may find bone cysts or solid tumours, and a ground-glass appearance of the skull and absence of lamina dura are relatively early features.

Difficulty is mainly encountered in the cases in which there are only metabolic changes, and primarily when the biochemical criteria are disordered by renal damage and there is an obscure hypercalcaemia. I should like to draw attention to the cortisone test, which has been described by Dent[2], as a diagnostic aid in these cases. Cortisone is given in the dosage of 150 mg. a day for 10 days and blood is taken for analysis before, and 5, 8, and 10 days after cortisone is begun. It has been fully confirmed that the hypercalcaemia of sarcoidosis will rapidly fall, usually to normal levels, during this time. In 6 cases of hyperparathyroidism subsequently confirmed at operation no appreciable changes in the hypercalcaemia occurred. It also appears that idiopathic hypercalcaemia of infants, as well as straight vitamin-D intoxication, will react likewise.

M. Modlin
406/7 Medical Centre
Heerengracht
Cape Town
13 May 1957

1. Editorial (1957): S. Afr. Med. J., **31**, 444.
2. Dent, C. E. (1956): 230, Brit. Med. J., **1**, 230.

The following letter has been received by the Secretary of the Medical Association of South Africa:

THE NURSING ACT AMENDMENT BILL

Dear Sir,

During the present session of Parliament the Government will introduce the Nursing Act Amendment Bill.

In terms of the existing Act, every registered Nurse is eligible to vote for and to become a member of the Board of Management of the Nursing Association, and of the Nursing Council. Now this Bill will curtail the right of nurses to vote for whoever they please as it restricts membership of the Board of the Nursing Association and the Council to persons of European descent.

Here, clearly, is an attempt to introduce *apartheid* and White guardianship into the Nursing Association, membership of which is compulsory on all registered nurses both White and non-White. Furthermore, while non-White nurses will continue to pay their registration fee to the Nursing Council, they will be debarred from taking part in the work of the Council.

We consider this to be an immoral, unjust and undemocratic measure designed to lower the status and dignity of the non-White nurse.

There have been attempts from certain quarters to have separate registers for non-White and White nurses, and a suggestion that training for non-White nurses will be inferior. This must of necessity result in a deterioration of the nursing of the sick, for which both doctors and nurses have a responsibility.

We are witnessing an attempt to destroy the time-honoured trust and mutual respect which has governed the relationship between one nurse and another ever since the days of Florence Nightingale. In this situation, the relationship between doctor and nurse cannot remain unaffected and in the final analysis it will be the sick who will suffer most.

In view of the far-reaching consequences of this Bill, we call upon all nurses and doctors who see the issues involved, to write and throw in their weight in opposition to it.

We shall be very glad if you will put our appeal to your Association members.

M. Festenstein (Sister)
Pelindaba
Colenso Road
Newlands, Cape
17 April 1957

RESULTS OF OUT-PATIENT TREATMENT OF GASTRO-ENTERITIS

To the Editor: In my article[1] published under this title in the *Journal* of 11 May at p. 446 certain of the asterisks (*) in Table V are wrongly printed as daggers (†). The table should read as follows:

TABLE V. CLINICAL ASSESSMENT COMPARED WITH DEGREE OF HYDRATION CALCULATED FROM WEIGHT GAIN ON RECOVERY

Case No.	(1) *Weight before Treatment* (*lb.*)	(2) *Weight after Treatment* (*lb.*)	*Days between* (1) *and*(2)	*Retrospective Calculated % Dehydration* $\frac{(2)-(1)}{(2)}$	*Clinical Assessment of Dehydration at first visit*	*Fluid given in 1st Subcut % body weight*
			Clinically Dehydrated			
18	12½	14½	4	14%	mild	2½%
23	9½	11½	5	14%	moderate	5%
26	8½	9½*	2	7%	severe	10%
38	9½	10½	7	10%	mild	2½%
40	12½	14½	6	13%	moderate	5%
41	6	6½	5	8%	mild	2½%
43	18½	19½*	4	2·5%	moderate	5%
44	12½	15	5	17%	severe	10%
45	6	7	3	14%	severe	10%
51	18	21½	7	16%	considerable	7½%
68	14½	16½	7	9%	moderate	5%
75	11½	12½*	2	8%	severe	10%
79	15	16½	6	9%	considerable	7½%
82	13½	15 *	3	8%	considerable	7½%
84	7½	7½	1	6·5%	moderate	5%
87	6½	7	7	12·5%	moderate	5%
88	10½	12½	5	12%	moderate	5%
89	10	11½	1	15%	considerable	7½%
90	5½	6½	6	10%	severe	10%
91	15½	16½	2	7%	mild	2½%
96	14	15½	4	10%	moderate	5%
98	13½	14½*	2	5%	considerable	7½%
				Average 10·2%		Average 6·4%
			Not Clinically Dehydrated			
58	13½	14½	5	6%	not	
60	17½	19 †	6	8%	not	
77	13	13½	4	2%	not	
94	16½	17½	5	4%	not	

* = diarrhoea better but not completely cleared at 2nd weight.

† = very mild case, on full strength milk from 2nd day. Part of weight gain probably due to tissue growth.

A. S. Truswell
Somerset Hospital
Cape Town
16 May 1957.

1. Truswell, A. S. (1957): S. Afr. Med. J., **31**, 446.